

American Forestry

DECEMBER

1911

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By C. J. BLANCHARD

STUDIES FOR REFORESTATION

By A. G. HAMEL

LOGGING ON A NATIONAL FOREST

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**DISPOSAL OF FIRE KILLED TIMBER ON THE
SOPRIS NATIONAL FOREST**

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**SCIENTIFIC MANAGEMENT AND THE
LUMBER INDUSTRY**

By PROF. R. C. BRYANT

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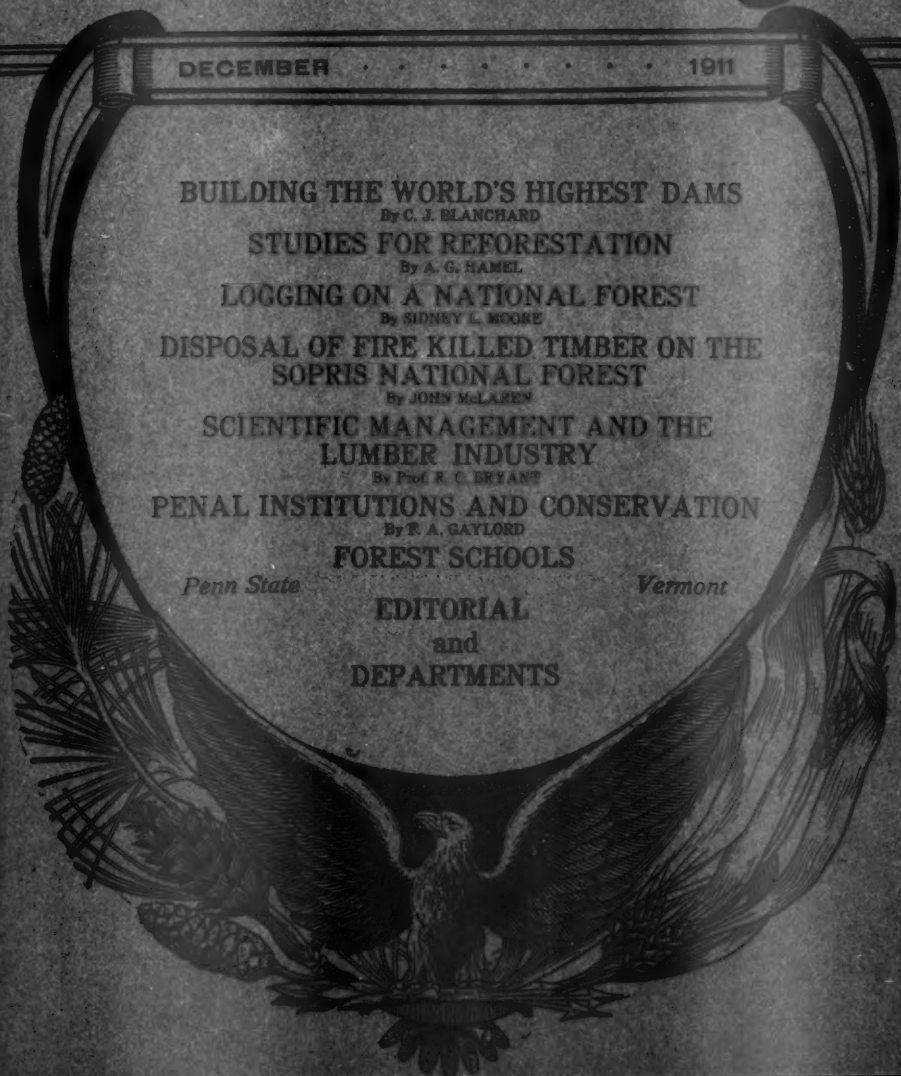
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MANUSCRIPTS submitted for publication should be addressed to the Editor, at the office of
publication, 1410 H Street N. W., Washington, D. C.

Indexes for Vol. XVI (1910) are ready and may be had on application

SPECIAL ANNOUNCEMENT

In August, extra copies of AMERICAN FORESTRY containing the following announcement were sent to all *American Conservation* subscribers:

In accordance with the announcement in the August number of "American Conservation," the "American Forestry" magazine, after August, will be sent in place of "Conservation." The statement in "American Conservation" that the subscribers to this magazine will receive "American Forestry" for the period of their unexpired subscriptions to the former is to be made more liberal, and all subscriptions with six months or less to run will receive "American Forestry" for a full six months, and those whose subscriptions will not expire for six months to a year will receive the magazine for a full year. The subscriptions to "American Forestry" of those who are already subscribers to both magazines will be extended six months or a year under the same arrangement as for those who are subscribers only to "American Conservation." This arrangement will be put into effect without the necessity for any correspondence on the part of subscribers, the only exception being in the case of those who desire to have the unexpired portion of their subscription to "American Conservation" refunded, in which case, of course, their names will be dropped entirely from the list.

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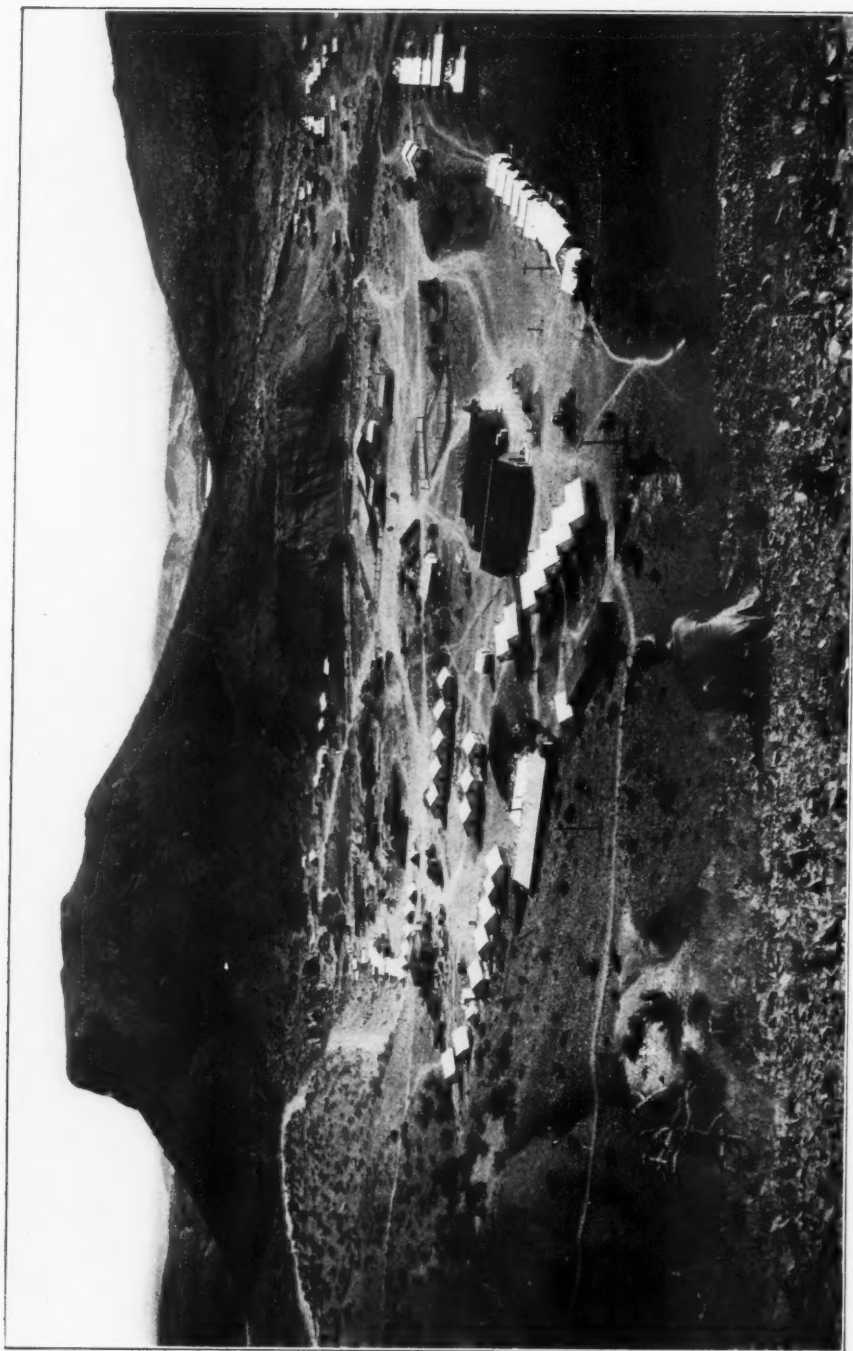
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ROBERT P. BASS,
President, American Forestry Association.

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American Forestry

VOL. XVII

DECEMBER, 1911

No. 12

BUILDING THE WORLD'S HIGHEST DAMS

By C. J. BLANCHARD

STATISTICIAN U. S. RECLAMATION SERVICE.

THE Reclamation Service in the nine years of its existence has worked out to successful conclusions many interesting and remarkable problems of engineering construction. Its works, being located generally in regions remote from transportation, have presented numerous difficulties and obstacles to overcome which ability and initiative have been required. The preliminary work consisting of the building of roads, securing rights of way, laying out of camps, and providing the supplies for thousands of men and teams in numerous instances has called for extraordinary foresight and has presented problems which were even greater than that of constructing the great structures for storage and diversion.

The Salt River project was notable in this respect. Preliminary to actual construction of the big Roosevelt dam, the engineer had to survey a wagon road 62 miles in length from the nearest rail transportation to the damsite. For 20 miles this highway was laid across a waterless desert, the balance of the route being through an extremely rugged mountain region. In the mountain section this roadway stands today as one of the finest pieces of road building in the country. To obtain lumber for the camps and buildings it was necessary to erect two sawmills in the national forest where several million feet were cut. A water supply was secured by piping springs several miles away. A large brick-making plant was established. Later a power plant generating 4,000 h.p. was erected and shortly thereafter the engineer set up a cement mill which turned out more than 300,000 barrels of high-grade cement at an enormous saving in cost. The labor problem here was partly solved by instructing 600 Apache Indians in the use of pick and shovel and in other forms of common labor. These phases of preliminary work are cited to make plain the fact that the completion of a large irrigation project in the arid West includes many problems which are not found in engineering works of like character in the East.

During the present year the Reclamation Service began the construction of two large engineering works, each of which is comparable with the work now completed in the Salt River Valley. One of these, the Engle Dam on the Rio Grande about 100 miles north of El Paso, will exceed the Roosevelt dam in cubical contents and in the capacity of its reservoir. The other, the Arrowrock dam in Idaho near Boise, will be the highest in the world. A very large amount of preliminary work was required for both structures. On the Engle dam, which is 13 miles from a railroad, it was necessary to have constructed a broad gage railway to bring in the machinery supplies and cement. The Government co-operated with the Santa Fe in building the branch line and regular daily trains are now running over it. In the various camps about the damsite there are residing approximately 1,500 people. The post office recently established at Elephant Butte, is now the most important in the county. At the Arrowrock damsite in Idaho the Service has nearly completed 22 miles of standard gage railroad and is already operating its own trains over the finished portion. About 800 men are now engaged in excavating for the foundations of this most remarkable dam in the world which is to be erected in the narrow and precipitous canyon of the Boise River. The camps at both damsites are interesting. In each the Government has provided a large reading room for the men which is equipped with books and periodicals. Entertainments in the way of illustrated lectures and church services and also dances are arranged and have become popular. At Elephant Butte a social organization known as the Order of the Royal Elephant has been formed and has a large membership. In both camps a volunteer fire department has been organized and is drilled nearly every evening. A test was given during the visit of Secretary Fisher at Arrowrock in September and in less than a minute the department was playing the hose on a building. The commissary for camps of this size, remote from large supply centers, is a most important adjunct. The Government runs its own mess, and operates in each camp a big department store, carrying all the lines which are needed to supply the wants of the men and their families. All goods are sold at cost plus a small percentage to cover expense of handling. Its ice plant, water works, electric light and other utilities are all available for its workmen. Numerous cottages have been built for the comfort of the engineers and their assistants for which the Government collects its monthly tribute.

THE ARROWROCK DAM.

The site selected for the Arrowrock dam is at a point known as Arrowrock in the Boise River Canyon, about 20 miles above the city of Boise, and four miles below the mouth of South Fork. This site was selected only after a long period of general investigation and months of digging and drilling to determine the exact point where the great structure should rest.

It will be the highest dam in the world, rising 351 feet from foundation to the road along its top, and the roadway will be guarded on either side by a parapet wall three and a half feet high. The dam will be about 25 feet



BUILDING 22 MILES OF STANDARD GAGE RAILROAD TO ARROWROCK DAMSITE NEAR BOISE, IDAHO, WHERE THE RECLAMATION SERVICE IS NOW CONSTRUCTING THE HIGHEST DAM IN THE WORLD.



ARROWROCK DAMSITE AND GOVERNMENT CAMP. THE EXCAVATION ON THE LEFT IS FOR A ROADWAY AND MARKS THE LINE OF THE TOP OF THE DAM.

higher than the Shoshone dam in Wyoming, 67 feet higher than Roosevelt dam in Arizona, and 54 feet higher than Croton dam in New York. Its curved crest will have a length of 1,060 feet. Its foundation will cover an acre of the bed rock. The diamond drills went down 90 feet below the river bed before finding the solid granite bed rock, and numerous test pits, shafts and tunnels were driven in the canyon walls above the water line. The dam will be constructed of rubble concrete, with as many boulders incorporated as can be done economically, probably 20 per cent of the whole mass. About 500,000 cubic yards of masonry will be required. Outlets will be provided at several elevations and starting with a full reservoir the upper openings will be put into commission first. Those lower down being used as the water level drops, so that it will not be necessary to operate any of the gates under very great heads. Provisions will also be made for penstock openings for a power house, in case it may be advisable later to develop power at this site.

A spillway with a normal capacity of 40,000 second feet will be built at the north end of the dam, with a concrete lip 700 feet long following the contour of the ground in a direction generally at right angles to the line of the dam. The water will fall over this spillway into a concrete lined trench parallel to it, by which means it will be carried well beyond the end of the dam and allowed to cascade over the granite cliffs into the canyon of Deer Creek, and thence back into the river. From the records of floods in Boise River it is believed that 40,000 second feet will more than cover any flood that will occur above this point, but the capacity of the spillway may be crowded to 40,000 second feet, and the dam will be so built that water may flow over it to a depth of two or three feet without endangering the structure.

One of the most important problems confronting the engineers was taking care of the river during construction. Two hundred and twenty-five thousand cubic yards of material must be excavated below the river bed. It has been decided to divert the water through a tunnel under the lava bench at the south end of the dam. This tunnel will be 500 feet long, 35 feet wide, and 25 feet high, the arched top having a ten-foot rise. The bottom and sides will be lined with concrete and the top with timber. This waterway will carry the flood waters of ordinary years. Five years will be required to complete the masonry work on this dam, and in the meantime the canal system will be extended to cover 243,000 acres of exceedingly fertile land in the vicinity of Boise.

THE ENGLE DAM.

While the Engle dam will be only four-fifths as large as the Arrowrock in cubical contents, its storage capacity is more than twelve times as great. It will rise 205 feet from foundation to top of parapet wall, will be 1,400 feet long on top, and will contain 410,000 cubic yards of concrete rubble masonry. At the bottom the dam will be 180 feet in thickness, tapering up to 20 feet at the top. It will create the largest artificial lake in the world, a lake 40 miles long, from one to five miles wide, and containing 2,538,000 acre-feet of water. At a gap on the west side of the valley several miles above the dam a spillway 800 feet long will be built at a height of 190 feet above the river bed.

The Engle dam will restrain the largest flood ever known in the turbulent Rio Grande, holding back the flood waters now wasted until needed in the months of low water flow.

In addition to the big dam four diversion dams will be required to turn the waters into immense canals which will distribute it over 180,000 acres of land. One of these dams, the Leasburg, is now completed, and 22,000 acres in Mesilla Valley are already under irrigation from the normal flow of the river.

Historically this is one of the most interesting sections of the United States. When Coronado and his followers swept up the valley of the Rio Grande in search of the Seven Cities of Cibola with their fabled golden treasures, he found the Pueblo Indians operating crude canal systems and cultivating their crops. The same ditches, some of them enlarged and extended, are in use today, but in many instances the ditches are small and crude, and the lands are tilled in the most laborious fashion, largely by hand. With the initiation of Government work modern methods were introduced by progressive farmers, there has been a healthy growth of cities and towns, and it is safe to predict that the time is not far distant when the Rio Grande Valley will be one of the progressive, up-to-date agricultural communities that characterize the West.

STUDIES FOR REFORESTATION

By A. G. HAMEL

FOREST ASSISTANT

HISTORY repeats itself" is an old adage that is often heard and one which seldom fails. This is especially so in case of the history of the development of the resources of a country. History is an accumulation of experience and experience is what makes perfect. European nations have been through the same crisis, with regard to their resources that the United States is passing through at present. Some have passed through it successfully, while others gave no heed until it was too late, so we must profit by the experience.

Much criticism and abuse has been heaped upon the Forest Service, more especially by those who are unfamiliar with its work and the results which men engaged in it are attaining. When immigrants first settled in this country the forests were abundant, covering the hills and vales as far as the eye could see. Agricultural land was needed and as a result the primeval forests fell before the advance of civilization. Man in a few years destroyed what nature had taken centuries to perfect. This continued until now what was once a dense forest is nothing but a barren waste with a few high stumps and burned trees left as a monument to the once covered hills.



BOISE DAM AT WHICH THE RECLAMATION SERVICE IS NOW ERECTING A POWER PLANT, THE POWER TO BE TRANSMITTED TO AND UTILIZED IN THE CONSTRUCTION OF THE ARROWROCK DAM.



PREPARATION OF THE GROUND BY PLOWING, AND SOWING THE SEED BEFORE THE HARROW WITH CYCLONE SEEDER. YELLOW PINE SOWING IN BLACK HILLS FOREST, SOUTH DAKOTA.



BROADCASTING BY THE USE OF CYCLONE SEEDERS WHERE THE SURFACE OF THE GROUND IS PARTICULARLY FAVORABLE FOR THIS METHOD. YELLOW PINE SOWING IN THE BLACK HILLS NATIONAL FOREST, SOUTH DAKOTA.

Nature was lavish and slow in her methods, she did not do everything in a day, so the problem of reforestation which confronts the Forest Service is one which requires slow, painstaking work and a great deal of observation on the part of the men engaged in it. Much of the preliminary work done along these lines has been misunderstood by the general public, "sample plots," "germination per cents," "physical factors of the habitat" and the like, meaning but little to the people at large until once explained to them. Recently an "old timer," while watching the men engaged in experimental work, was heard to remark, "I don't for the life of me see why those Forest Service men want to dilly dally around the hills scattering a few seed broadcast, now and then sewing them in spots, raking some and leaving others undisturbed." They don't even complete it at one time, but come back at different seasons of the year and do the same thing over and over again. Occasionally they come around and locate the small trees by placing a white peg with some figures on it near each tree, fill cans full of dirt and so many other foolish things. The trouble that these fellows go to in this work is all nonsense. I could take a sack of seed and sow more in a day than they would in a year. Why don't they sow a large amount of seed and not fool around marking out small areas with white posts with red and black tops, carefully weighing out and sowing the seed? Nature does not go to all this trouble in growing trees." This is one of many similar remarks heard made by people who are not acquainted with what the men are doing and what they are accomplishing.

European experience has helped us to a great extent, but the problem of reforestation is largely a local one and must be dealt with accordingly. It is to be regretted that not all potential timber lands secure a thrifty stand of young growth "naturally." If they did, the problem of reforestation would be a simple one. In order to best study this problem, which is a very intensive one, sample plots are used to the best advantage. They often mean something very vague, indefinite, and impractical, to those not acquainted with that class of work, but when once understood their value is appreciated.

Nature in her work did not always use the best judgment in determining what species of trees should cover the different regions, but man after many years of study and observation has been able to improve upon her work. Nature has in many instances taken care of reforesting the cut-over and burned-over areas, but where the destruction has been too great, man must intercede before it is too late as it was in parts of France and China. In order to determine the best methods of reforesting these areas small typical sample plots are laid out where all feasible methods of reforestation are tried so as to determine conclusively the proper method before trying it on a more large and expensive scale. Injudicious application of the different methods may result in a total failure, which often eventuates in a great deal of damage through erosion, for instance, or deterioration of the soil.

The work of the Forest Service in the past has been largely of an extensive nature along constructive lines, but now the work has become more settled so that in the past few years it has been much more intensive. The sample plots which have been maintained and studied carefully have taken considerable time, due to the great care which is exercised in this kind of work, but the results obtained are something that can be depended upon since the factor of careless work is entirely eliminated. An illustration of some of this intensive work done on the San Isabel National Forest might explain some of the whys and wherefores. It has always been the idea of nursery men throughout the country that the best depth of sowing seed was to sow it two to three times the diameter of the seed. This was done as nearly as possible in all the seed sowing, but when no appreciable results were obtained, apparently due to the fact that the seed dried out before germination took place, the question naturally arose whether or not the seed was planted deep enough to overcome the drying effect of the dessicating winds which are prevalent in the Rocky Mountain Region during different seasons of the year. Small typical areas, called sample plots, were marked out by having white posts with black tops driven in at the corners of the plot to designate the boundaries. The size of the plots was but 40' x 40' in order that the work be as intensive as possible. Five white stakes with red tops were placed at five different points in the sample plot to mark the sampling points, that is, the points where to take the soil samples which are used in determining the amount of moisture in the soil. The seed is carefully tested in order that the kind of seed may not have any unknown influence upon the results. The same amount of seed was sown in each sample plot, the only difference being that they were sown at different depths. The seed in one bed was shown at a depth of $\frac{1}{4}$ " in another bed $\frac{1}{2}$ " and so on up to 2" in depth. Soil samples to determine the amount of moisture in the soil were taken at different seasons of the year so as to know what influence this had upon the final results. Whenever any of the seed germinated a small white peg bearing the date of observation was placed alongside of the seedling as a permanent record. In some cases where the work is most intensive and all the factors of influence are measured, anemometers (wind gauges) are used to measure the velocity of the wind, psychrometers to determine the amount of moisture in the atmosphere and photometers to determine the intensity of the sunlight. In this way all the factors concerned are measured on the different plots so that the results obtained on the different areas can be explained by facts and figures and not by guess work. After repeated observations it was found that the seed should be sown from one to one and one-half inches in depth in order to produce the best results, because these depths showed 25 to 50 per cent better germination than the other depths, under exactly the same conditions. While these results are not conclusive they offer at least a criterion on which the Forest Service men can base their work on a larger scale. This class of work is slow, it will, however, ultimately mean that the Forest Service work will be built upon such a sound basis after years of experimentation that the saying, "success comes to him that tries," will not be amiss.



FIVE-YEAR-OLD YELLOW PINE FROM BROADCAST SPRING SOWING ON THE BLACK HILLS NATIONAL FOREST, SOUTH DAKOTA.



PREPARATION OF THE GROUND AND SOWING OF SEED BY THE SEED-SPOT METHOD. YELLOW PINE SOWING IN THE BLACK HILLS NATIONAL FOREST, SOUTH DAKOTA.



No. 1. A VIRGIN STAND OF LODGEPOLE TIMBER, WHICH HAS NEVER KNOWN THE LUMBERMAN'S AX.



No. 2. THIS SHOWS THE DENSITY OF THE LODGEPOLE PINE ON THE BIGHORN NATIONAL FOREST. IT IS FROM 12 TO 24 INCHES IN DIAMETER.

LOGGING ON A NATIONAL FOREST.

By SIDNEY L. MOORE.

ASSISTANT DISTRICT FORESTER

HOW do lumbering operations on the Government's National Forests differ from those of the private company upon its own lands?" is a question constantly asked by interested lumbermen for the reason that the exploitation of stumpage purchased from the Government is daily undertaken by an increasing number of lumbermen who have no timber supply of their own or have exhausted their holdings. This meant to be a brief, pictorial description of a large lumbering operation upon the Bighorn National Forest in the Bighorn Mountains of Wyoming, showing the progress of the timber from the stump to the mill yard. It makes plain that the differences between logging on private and on government lands are slight in so far as they affect the pocketbook or profits of the logger. On the other hand, the slight differences in methods which do exist, while costing but little to the logger, make a tremendous difference in favor of protecting the existing forest and encouraging future growth.

In this particular operation the timber consists of lodgepole pine, of which there are heavy stands located in the Bighorn Mountains at an elevation of from 8,500 to 9,300 feet, some twenty-five miles from the nearest railroad. The most valuable product of this operation is railroad cross-ties, but the operator also manufactures and sells mine timbers and lumber. The timber is manufactured in two mills, a small sawmill located in the mountains and the main mill twenty miles away in the valley, on a side track of the main line of the railroad. The logs, ties and such dimension stuff as is cut at the smaller or upper mill are shipped in a V-shaped water flume 25 miles through the mountains to the large mill and yards below.

Views Nos. 1 and 2 show the virgin stands of lodgepole timber before they have been touched by the ax. The timber is naturally of rather small size, ranging from 12 to 24 inches in diameter, but these sizes are especially suitable for the production of railroad ties and mining timbers, with a limited quantity of "side lumber."

View No. 3 shows the forest after it has been cut and the logs and ties removed. In this picture are shown the piles of brush made from the top of the tree which could not be utilized. When operating on National Forests, the logger must pile the brush and refuse as shown here, but the extra cost

entailed does not exceed 25 or 30 cents per thousand board feet cut. In contrast, View No. 4 shows some private timberland which has been cut over in the same general locality without any disposal being made of the tops and other debris resulting from logging. There is no need to point out to any lumberman the fact that the conditions shown in View No. 4 present a fire trap that is a constant menace to the property of all timberland owners, government, corporate and private.

After the National Forest area has been cut over by the lumberman, who has removed the largest and best of the mature trees, the brush piles shown in View No. 3 are disposed of by burning. The brush piles on this area were burned by Forest officers during the winter when the ground was covered with a foot or two of snow, which eliminated the danger of fire running in the forest.

View No. 5 shows the log pond and small sawmill located within the National Forest where the smaller logs are cut into ties or mine timbers and the larger logs are slabbed for shipping through the flume to the larger mill in the valley.

View No. 6 shows a railroad tie which has just taken the plunge into the flume after it has been thrown off the carriage of the small sawmill, from which it goes floating on its course to the yards of the valley mill.

Views Nos. 7 and 8 show the large sawmill plant in the valley where the timber not handled in the smaller mill is finally manufactured into merchantable products. The smaller trees and top logs which are used in the round, for mining timbers are lifted from the log pond and placed in the mill yard by the chain conveyor shown in View No. 7. The railroad ties which have been floated down from the mountain are loaded direct from the mill pond on an endless chain into the railroad cars.

The only points in which this logging operation differs from one conducted upon private lands is in the piling of the brush, the leaving of a fair stand of young timber, and the protection of that timber so that it may produce a future crop of merchantable trees. Lumbermen throughout the western part of the country already keenly realize the manifold advantages which they gain by purchasing stumpage from the National Forests and sales of government timbers have shown a tremendous increase within the past few years. Two of the most important advantages which a lumberman gains by purchasing his stumpage from the government consist in the fact that he assumes no fire risk, since if the timber were burned before he had completed cutting his purchase, the loss would fall upon the government, and, secondly, by purchasing stumpage from the government he is enabled to pay for it under a system of partial payments and avoid the necessity of having a large amount of capital tied up in standing timber long before he can realize upon it.



No. 3. PRIVATE TIMBERLAND AFTER LUMBERING BY PREVAILING METHODS OUTSIDE THE FOREST. THE CONTRAST BETWEEN THIS FIRE-TRAP AND THE SERVICE CUTTING IS APPARENT.



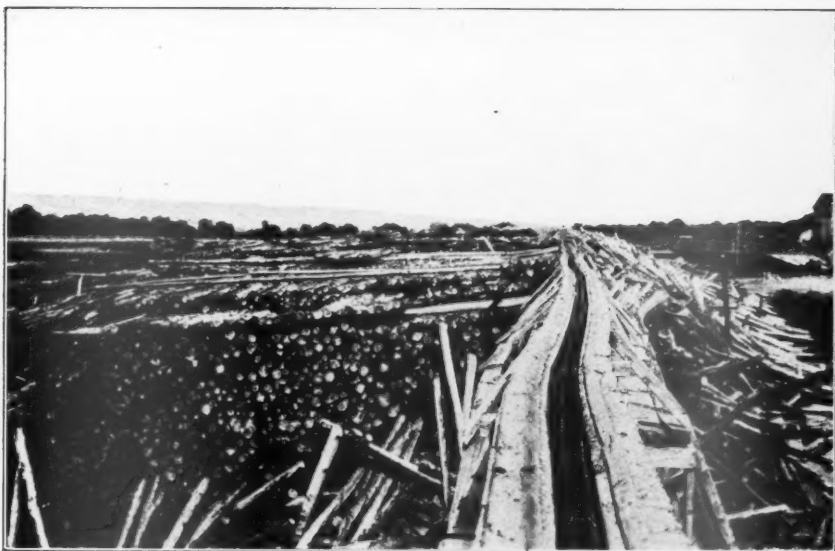
No. 4. THE FOREST AFTER LUMBERING WITH LOGS AND TIES REMOVED AND BRUSH PILES MADE FROM THE TOPS OF THE TREES THAT CAN NOT BE UTILIZED.



No. 5. THE LOG POND OF A SMALL SAWMILL LOCATED WITHIN THE BOUNDARIES OF THE FOREST. TIES, SMALL LOGS AND LARGE SLABBED LOGS ARE FLUMED TO THE LARGER MILL IN THE VALLEY.



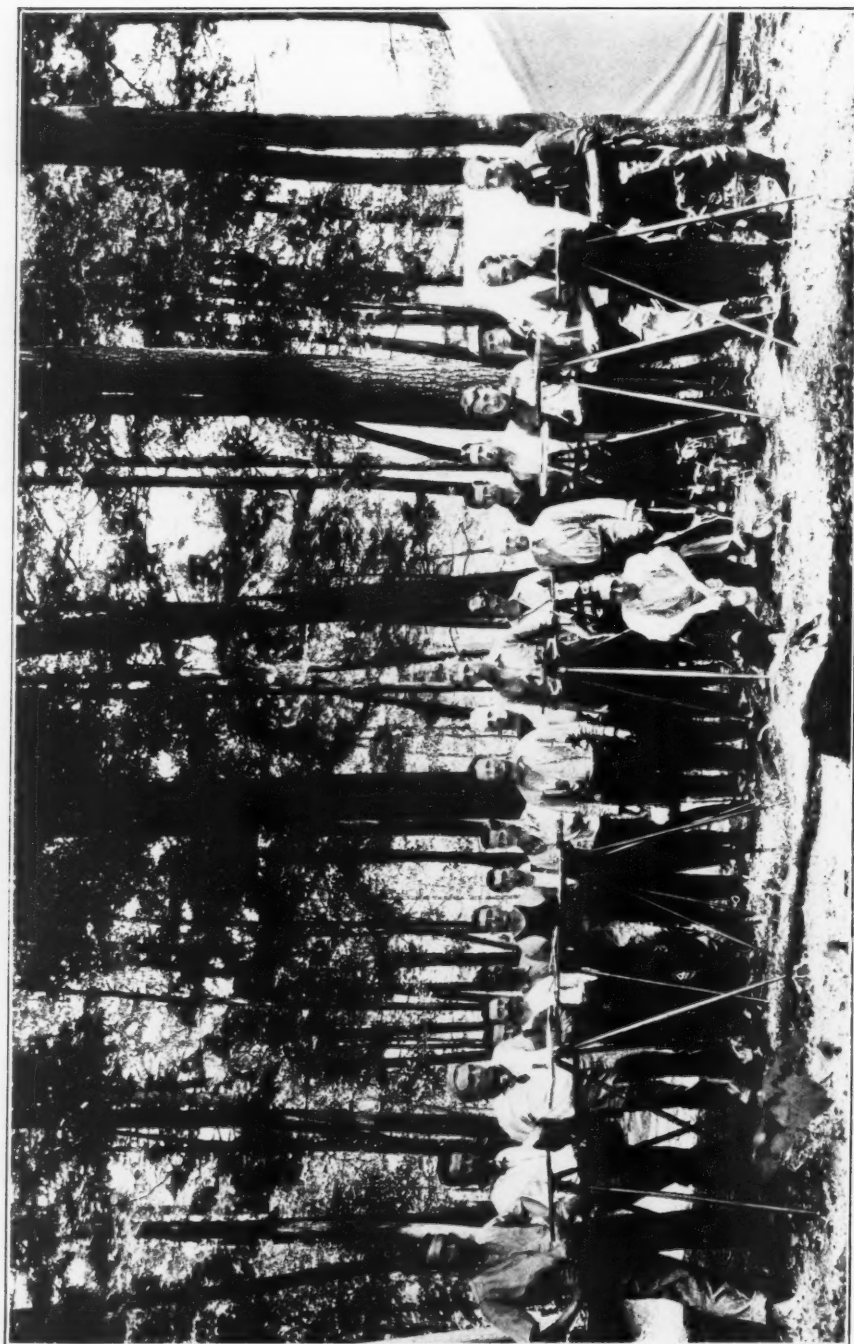
No. 6. THE SPLASH FROM A RAILROAD TIE THAT HAS JUST BEEN THROWN OFF THE CARRIAGE OF THE SMALL SAWMILL, INTO THE FLUME.



No. 7. THE SMALL TREES AND TOP LOGS USED IN THE ROUND FOR MINE TIMBERS ARE LIFTED FROM THE POND TO THE MILL YARD BY THE CHAIN CONVEYOR.



No. 8. A GENERAL VIEW OF THE LARGE SAWMILL IN THE VALLEY WITH ITS MILL POND, FROM WHICH TIES ARE LOADED DIRECTLY ON THE CARS BY ENDLESS CHAIN.



RETURNING FROM A HALF DAY'S WORK WITH TRAVERSE TABLES, PENN STATE FORESTRY CAMP, HICKS RUN, PENNSYLVANIA.

Photo by Hugh P. Baker.

PENN STATE COLLEGE OUTLINES A NEW UNDER-GRADUATE COURSE IN FORESTRY.

By PROF. H. P. BAKER

DURING the past ten years most of the Departments or Schools giving undergraduate work in Forestry have outlined their courses largely upon the basis of work done in the schools organized earlier at Cornell and Yale. Many of these courses started out with an elementary or synoptical course which was designed to be a general course giving students a rapid survey of the development and practice of Forestry in this country. Following these were courses in Silviculture, Mensuration, Management, and other courses as time allowed. Most of the courses were given with a relatively small amount of practicum, though the amount of theory and practice necessary in both graduate and undergraduate schools will probably be a disputed question for some time. So far many of our undergraduate courses have been weak through lack of work in such closely related lines at Botany, Zoology and Entomology, Geology and Mineralogy, Economics and the English Language. This condition is often difficult to remedy because the work was outlined in departments preparing men mostly for other lines of work or departments were organized where they are controlled too largely by interests of the schools of which they are a part, such as Engineering, Agriculture or Liberal Arts.

The course given below has been adopted recently for the Department of Forestry in The Pennsylvania State College, and it is believed that for the present time it meets very nearly the requirements for training for an undergraduate degree in Forestry. The first year and a half is given to foundation subjects in the following proportion:

Mathematics and Mechanical Drawings.....	7 hours
French or German.....	12 hours
English Composition.....	10 hours
Chemistry	11 hours
Botany	10 hours
Carpentry	1 hour
Geology	4 hours
Physics	4 hours
Surveying	3 hours

AMERICAN FORESTRY

Sophomore Year

SECOND SEMESTER

Agron. 6 Soils (Forest).....	4
Agr. Chem. 20 Chemistry of Forest Products.....	4
Survey. 14—Topographic.....	3
Foren. 4 Debating.....	1
Fr. 4 Ger. 4 or option.....	3
Phys. Ed. 4 Drill.....	1
Forest. 2 Silviculture (Nursery Practice).....	4
Forest. 15 Dendrology 1.....	2
Summer School—Forest. 7 (8 weeks).....	7
Mensuration	
Engineering	
Systematic Botany	
Forest Description	

Junior Year

FIRST SEMESTER

Foren. 5 Public Speaking.....	1
Hist. 1 English Economic History.....	3
Zool. 2 Elementary Zoology.....	3.2
Bot. 6 Plant Physiology.....	4
Min. 1 Elem. Mineralogy.....	2.4
Forest. 3 Silviculture.....	3
Forest. 4 Mensuration.....	3
Forest. 15 Dendrology II.....	2

Junior Year

SECOND SEMESTER

Bot. 7 Histology.....	3
Bot. 11 Diseases of Trees.....	3
Foren. 6 Public Speaking.....	1
Pol. Sci. 13 Political Parties.....	4
Hist. 2 Amer. Econ. History.....	3
Zool. 8 General Entomology.....	4
Forest. 10 Wood Technology.....	3

Senior Year

FIRST SEMESTER

Pol. Sci. 14 Economics.....	4
Zool. 11 Forest Entomology.....	3
Forest. 8 Management.....	4



Photo by Hugh P. Baker.

LUMBERED AND BURNED TRACT WITH VIRGIN FOREST IN BACKGROUND NEAR CAMP
OF PENN STATE FORESTERS ON JOHN E. DU BOIS HOLDINGS
AT HICKS RUN, PENNA.



Photo by Hugh P. Baker.

HEMLOCK CUT AND PEELED. HARDWOODS TO BE TAKEN OUT IN THE WINTER.
NEAR PENN STATE FORESTERS CAMP, JUNE, 1911, ON TRACT JOHN E.
DU BOIS NEAR HICKS RUN, PENNA.



VIRGIN FOREST NEAR
CAMP OF PENN STATE
FORESTERS ON JOHN E.
DU BOIS TRACT NEAR
HICKS RUN, PENNA.
LARGE CUCUMBER TREE
in MIDDLE GROUND.

Photo by Hugh P. Baker.



Photo by W. D. Clark.

CAMP OF PENN STATE FORESTERS IN VIRGIN FOREST OF HEMLOCK AND HARDWOODS
ON HOLDINGS OF JOHN E. DU BOIS NEAR HICKS RUN, PENNA.

Forest. 9 Lumbering.....	3
Forest. 13 Law.....	3
Forest. 17 Forest Economics and History.....	2
Forest. 22 Forest Engineering.....	2
Second Semester—In Camp in the South or West	
Forest. 16 Lumbering	
Forest. 18 Management	
Forest. 23 Forest Report Writing and Abstracting	
Forest. National Forest Practice	
Forest. Range and Grazing Problems	

The number of hours refer to the number of recitations per week. One recitation period being equal to two of practicum.

Eight weeks of the Sophomore summer is spent in field work on some large forest holding in northern or western Pennsylvania. For the past three years this summer work has been given on the Fox Estate at Foxburg, and on lands of the John E. Dubois Lumber Company at Hicks Run. The accompanying pictures show something of the conditions on the last mentioned tract. In connection with this Summer Camp there will be offered for the first time in the summer of 1912 a Forest Camp of six weeks for prospective students, timber and woodlot owners, and any one else interested in Forestry. The work for men coming into this camp will be along the lines of Forest Mensuration, Silviculture, Geology and Soils, and Descriptive Botany.

The number of students in the course in Forestry has increased from 5 in 1907 to something over 180 in 1911. The present Freshman Class numbers about seventy men, over half of whom come from outside of the state. Located as the School is, in the mountains of central Pennsylvania and within a short walk of one of the largest state reservations, there are undoubtedly as good facilities for practical study and work as are found elsewhere in this country. Rather unusual soil conditions exist at and near the College, giving interesting differences in plant and forest growth, all of which add greatly to facilities for study. The College lies in a broad limestone valley covered with a hardwood and coniferous growth in which Chestnut is entirely absent. Over the granitic hills two miles to the south there is a mountain forest in which Chestnut, Rock Oak, Red Maple, several Birches, Hemlock, and three Pines predominate. Just to the north of the College is an extensive area known as the Sand Barrens, where the Pitch-Pine is found in abundance mixed with Chestnut and numerous other hardwoods.

The teaching staff of the Department has been increased to four this year and is now made up of two graduates of the Yale Forest School, one from the Harvard Forest School and one from the University of Minnesota.

SCIENTIFIC MANAGEMENT AND THE LUMBER INDUSTRY

BY PROF. R. C. BRYANT

SCIENTIFIC management applied to manufacturing industries has received much attention during the last few years and has met with signal success. The central idea in this movement has been the increase in efficiency of the individual workman and of the shop, by collecting and reducing to a standard, facts concerning the best practice among the competent workers performing a given class of work; by the introduction of modern types of machinery operated at its highest efficiency; and by improvement of factory organization and supervision.

Individual lumbermen have done much thinking along these lines and have put some of the principles into practice. However, as a whole, the industry has not profited greatly from work of this character, for it is still a mooted question to what extent scientific management can be applied to the industry.

It is doubtful if there is any close analogy between the workshop, or factory with its specialized product, continuous operation without reference to climatic conditions; and the camp in the forest with its constantly changing crews, with climatic conditions which may hinder, or prevent operation for a certain period, and where every acre logged and every tree felled may present a new problem.

At the plant of the lumberman methods of manufacture can be standardized to a degree at least; the labor is more stable and the work may be under cover and thus adverse weather conditions overcome. However, even in the mill the problem is not so simple as in a factory. Each log presents a new problem to the sawyer who aims at the best results, because the position, number and character of defects are rarely the same in any two logs.

The lumber industry in the past with its abundant and cheap raw material did not devote a great deal of time to the development of the finer points of organization and administration, especially in connection with the logging end of the business. The time has now come for the lumberman to perfect his organization and eliminate all wastes, if he is to succeed in a business in which the price of raw material is constantly advancing, labor charges increasing and its efficiency decreasing.

The methods of work outlined for manufacturing plants may not prove

adaptable to logging and lumber manufacture, but the general principles underlying the schemes advocated by experts on scientific management contain many helpful suggestions to those who are interested in developing their work to the point of maximum efficiency.

The management of every large lumber operation should have on file in the office, detailed data regarding the title to the property, the character, the amount, and condition of the timber; methods of logging adapted to the region; a scheme for fire protection, etc. This can best be secured by the organization of a forest department in charge of a man capable of supervising cruising, engineering and forestry work. If the size of your operation does not warrant the establishment of the work on a permanent basis, experts can always be secured at a reasonable cost.

The high stumpage values of to-day call for more careful cruising than has been the rule in the past. The owner should know not only the amount of each merchantable species on his land, its location with reference to the topography and outlet; but also should have accurate data about its quality. A knowledge of the latter factor becomes more valuable with each increase in the price of stumpage.

Topographic maps are now considered an indispensable part of every manager's equipment, by all who have been fortunate enough to have used them. In a rolling or rough region they will save, in a short period, many times their cost.

Topographic maps are often made at the time of the timber cruise. They should show the location of all streams, roads, trails, swamps, burned areas, agricultural land, and the elevation of all points. On such maps are often shown in colors, the stand per acre of the different species. The exact location of all timber, the position of light and heavy stands, burns, etc., can be seen at a glance. Accompanying this map should be a report on each logging unit giving all data that is necessary for an intelligent understanding of the problems involved in logging the area.

The entire system of logging roads can be laid out in the office on such a map, and a logger may know several years in advance where his main roads can be located to best advantage; the mileage required and any special difficulties that must be overcome. Careful planning of roads with reference to logging the area as a whole effects a saving in logging costs by reducing the amount of road building.

A PRACTICAL DEMONSTRATION

The value of a map of this character was demonstrated during the spring of 1909. The senior class of the Yale Forest School made a survey and prepared a topographic map of a tract of 30,000 acres in eastern Texas, in a region where railroad location was not easy, because of the broken character of the country. The engineer of the company about one year later was called upon to build an eight-mile extension to the main line which was to pass over

a portion of the tract surveyed, and over which he had never traveled. He laid out the road on the topographic map in the office before beginning field work. After selecting the route which looked most feasible, he went to the field and was able to locate on the ground over five miles of road on the route he had chosen in the office. The location of the remainder of the line was not altered more than a few hundred feet at any point. The work was accomplished in one-fourth of the time required under the old method.

Maps and data of this character are also a great aid to the management because it preserves on paper a vast amount of valuable information often carried in the heads of certain woodsmen of the company. These men may leave your service, and the knowledge they have gained at your expense is gone and can only be acquired by the expenditure of more time and money.

A new foreman can be taught more about your property, in an hour, from a topographic map than he could learn by traveling over the ground for a week. Further, it enables you to discuss with him the plans for logging; show the area to be logged the next season; the mileage of road to be built; the character of "logging chance" he will have and many facts that he often otherwise has to determine for himself when he arrives on the ground.

No lumberman should be satisfied with his operation until he has proven to himself that he has a system as efficient as it is possible to secure. Forest laborers, as a rule, do not migrate out of the general forest region in which they receive their training, and consequently have no opportunity to learn methods other than those common to that particular section. Although the methods in use are usually those best adapted for the conditions existing there, it often happens that woodsmen in other regions have developed methods that are preferable for special conditions you may have to meet. The collection and standardization of the methods of progressive loggers in a given section would be most valuable to every operator.

The organization for the protection of the property against fire is one of the least efficient parts of many lumber operations. Companies conservative in business who carefully protect their manufacturing plant often neglect their stumpage, a product far more difficult to replace than a mill on which insurance can be secured. Although practically non-insurable, stumpage has been left to care for itself until the last few years, and in some sections it still does not receive ample protection.

Every large company should have some comprehensive scheme of fire protection worked out for its tract, and an organization capable of putting the policy into effect when it is required.

CARE OF DETAILS

Improper supervision of felling and log-making crews often results in waste. Through the faulty selection of log lengths and careless marking off of the same, the daily loss often averages several hundred feet log scale per crew. Breakage, due to careless felling and other causes, may increase this

amount. A daily waste of 500 feet log scale per saw crew due to carelessness has been observed on yellow pine operations in the South.

The loss to the stumpage owner is greater than first appears, because it is not only the stumpage value that is sacrificed, but the sale value of the product on the car. It requires but little more effort to bring in a log 16' long than it does one 14' long; the cost of skidding, loading, and transportation to the mill, are increased to only a very limited extent, and on reaching the plant the added cost of manufacture is nearly nil. Therefore you lose the value of this product on the car, because it costs you practically no more to place it on board ready for shipment than it does to leave it in the forest to rot. Close supervision of the saw crews will remedy this matter at a cost which will be a fraction of the loss you otherwise suffer.

There is a wide variation in the rations given to logging animals, and it is certain that they are not always fed economically. The requirements of animals for food are dependent on weight and the amount of work being performed. Each animal requires a certain amount of concentrated food from which it derives the major part of its nourishment and a certain quantity of coarse food which gives bulk to the ration.

There are several essential elements in the concentrated foods which are required in fairly constant quantities for a given weight of animal, when performing a specific kind of work. Different feed stuffs contain these elements in widely varying proportions, and the test of a balanced ration is the ability of an animal to maintain an even weight under the conditions in which it is working.

Every logger should adopt a standard ration for his animals based on tests made under working conditions. The general requirements of animals have been studied extensively both in this country and abroad and data on the subject can be secured from the U. S. Dept. of Agriculture.

Many business men spend much time on the preparation of statements showing the cost of production. These are of value as a guide for comparison of actual costs, but do not show whether the average is greater than it should be.

A close study of the various parts of the operation and the preparation of a statement from the data secured, offers a means of comparison of actual and standard costs, and will point out the weak points in the present system. It enables the management to pick out the departments in which the expenditures are excessive, and to make such changes as are necessary to remedy the faults.

Estimated costs exert a beneficial influence over foremen and other subordinates, because when the actual outlay exceeds the estimate made by them at the beginning of the season their reputation is at stake. The incentive is present for them to attempt to keep expenses down. Where there is no check of this character, it is easy for the foreman to say that high costs are due

to special difficulties encountered, such as inclement weather, bad bottom, or similar factors.

One of the largest operators in the Northeast has given the subject of "efficiency" in woods operations much thought. His scheme requires the collection of data regarding the property preliminary to the beginning of operations; careful supervision and inspection of all parts of the woods work; and a system of records in which detailed account is kept of all work to be performed and all work actually performed.

The plan has been developed from the management side because the company has not yet satisfied itself that a piece work basis of remuneration, with a bonus for superior work, is adapted to their conditions.

The general scheme has been built up gradually and is the result of years of thought and study. While it has met the needs of the particular operation for which it was designed it may not be applicable in all of its details to other operations. It is adapted only to large business concerns, because of the added inspection and clerical force needed to carry out the plan.

KEEPING ACCURATE RECORDS

The system of records is of interest because of its completeness and the success which has attended its use. These comprise three separate sets of books known respectively as the budget, accounting and the statistic.

The budget contains a statement of the work to be accomplished during a given period, preferably for the coming season.

It covers all phases of woods work and is made up by foremen and others in charge of field work. It contains a concise statement of the exact character of the work to be performed under a given foreman's direction; the dates on which, or the period in which it is to be performed; the number of men, animals, equipment and supplies required; and the estimated cost in detail. From this budget the management learns just what work each foreman considers essential; can determine when, where, and what supplies and equipment are needed and the approximate expense of logging for the season. The company also has a standard with which the actual costs can be compared, and if the estimated expense is exceeded, or additional equipment or supplies called for, explanations are in order. In fact, the budget reduces loose guess work to a system.

The second branch, called accounting, deals with the records that pertain to the conduct of the scheme laid down in the budget. The object is to collect reliable and prompt reports regarding the operation in order that the management may have a statement showing the exact status of work to date. This file does not leave the office. Extracts from it may be sent out to subordinates to whom it may concern.

The statistical feature of the records is concerned with the accumulation of the experience and data secured in carrying out the operation. This is the basis of new schemes, or revision of old. It is also an office record.

DECREASING MANUFACTURING COST

The manufacture of lumber is under the direct supervision of the management and the details of organization have received more careful attention than those in woods work. Certain forms of mill work also lend themselves more readily to standardization. Among these may be mentioned unloading logs at the pond, lumber piling and loading, dry kiln work, etc. Work of this character is frequently performed by contract, but even so it may not be done economically. In numerous instances the costs of manufacture could be reduced by a careful study of conditions at the plant.

An example of this was observed in a large mill in the South where, for that section, an unusually intelligent class of foremen were in charge. The cost of operation was considered below the average of mills in the region and the management was satisfied with the results.

The plant consisted of two separate mills, yards, and planing mills, but had only one system of sheds. The yards were each in charge of a foreman, and the sheds were under the supervision of one man. A certain amount of jealousy arose between the different foreman in an effort to keep down the cost in their department, and each man was inclined to throw minor expenses on some other foreman.

To obviate this and to secure closer co-operation among the foremen engaged in handling lumber, a re-organization was made. One yard foreman was assigned to other work and the two remaining men were called to the office and a proposition made to them. The management calculated that the cost of operation in the two departments, through co-operation could be reduced at least ten cents per M feet. They therefore proposed the following: they would guarantee to each foreman the regular salary he had been receiving and in addition one-half of all the saving effected below the sum fixed as the standard cost.

No provision was made by the management for compensating the individual workmen, since the foreman had the authority to hire such labor as they required and pay such wages as were necessary.

The proposed plan met with much favor, and after discussing the situation the foremen decided that they could dispense with fifteen men in the two departments, and accordingly had them transferred to other work. The tasks of some men were increased with added pay, in other cases a more systematic plan of operation took care of the extra work without imposing undue burdens on any laborer.

The results secured by this arrangement were favorable from the start, and the foremen not only kept the price to the standard set, but soon had reduced it five cents, and had in view new methods which would still further cut down the cost. The consequence was that the company was getting its work done cheaper than formerly and the foremen were making higher wages than they could hope to secure under the old system. A stronger personal interest in the work on the part of the men concerned was manifest from

the start. This company has in mind the extension of the system to other work around the plant and also to some of the work in the woods.

THE PIECE WORK SYSTEM

Another application of the piece work system to the lumber industry was observed in a cypress mill which was visited in 1907. The system at this plant has been extended to cover railroad construction, deadening timber, felling and log-making, skidding, pond work, sawing in the mill, piling in the yard and loading on the car, and shingle and lath manufacture.

The method of payment for sawing lumber is unique. In order to encourage the production of high grades of lumber a scheme was devised for the payment of sawyers, edgemen and trimmermen on a basis of quality as well as quantity. A scale of wages on a basis of M feet manufactured was drawn up and in it a premium was placed on the higher grades, with no payment for No. 2, or poorer lumber.

The company has a shingle mill in connection with the plant in which the inferior logs and cants are utilized. In order to overcome the tendency of the sawyers to cut the high grade lumber from the outside of the larger logs and send the inferior center to the shingle mill, a standing order is in force to cut any kind of lumber rather than to send material to the shingle mill.

The tendency of the sawyers to escape cutting low grades is also checked by paying the mill foreman on the basis of the mill cut, without reference to quality. The foreman's desire for a maximum output, coupled with the sawyers desire for quality, keeps the work at a high point of efficiency and yields satisfactory results from the standpoint of the management.

The piece work basis of remuneration has been used for many years by lumbermen, especially in the South. Its introduction was due largely to the irresponsible character of the labor from which satisfactory service could seldom be secured on a daily wage basis. Although widely applied, this system has been considered chiefly from the standpoint of the employer, and little thought has been given to aiding the employee to become more efficient at his task, or to offer him any incentive for increased effort.

Remuneration on a basis other than that of the wage, has come to stay in the lumber industry, and the present ideas are certain to change in favor of some scheme of reward or special ability.

Along with the development of the labor problem will come plans for the better care and management of the forest, more intensive methods of logging and manufacture, and the closer utilization of the raw material of the forest and the finished product at the mill.

The economic forces that are driving industrial plants to adopt more scientific methods of management, in their fight for existence, will soon become vital to the lumber industry. The greatest measure of success will come to those who have intrenched themselves behind an organization which will enable them to place their product on the market at the lowest possible cost in competition with their rivals.

DISPOSAL OF FIRE-KILLED TIMBER ON THE SOPRIS NATIONAL FOREST

By JOHN McLAREN

FOREST SUPERVISOR

WITH approximately 138,000,000 board feet of fire-killed timber on the Sopris National Forest, Colorado, the disposal of this material is one of the principal problems that confronts the officers of the Forest, not only to gain a market for that which is merchantable, but to secure the removal of a fire menace.

No watershed on the Sopris has escaped devastation by fire. This does not mean that there is no live timber on the Forest, or that there are not some portions of watersheds which are virgin timber and have never been cut or burned over. As a matter of fact, there is more than three times as much live timber as dead, though this estimate is ocular; it is nevertheless conservative, and it will probably be found that the proportion of live timber will be even greater when actual reconnaissance work is finished.

The dead timber is of all sizes, from small seedling growth to large trees which were fully mature before they were killed. The greater part, however, consists of poles and log timber of merchantable size. Since the burns are from six to more than thirty years old, the timber represents all stages of decay. Yet it has deteriorated but slowly, possibly because of the altitude and climatic conditions, and there are but few localities where the largest portion of the timber is not still merchantable. These things have brought about a concentration of thought on this one problem, but the dominant idea has been to find new markets and new methods for the disposal of the dead timber, so that the burned areas may be cleared and the live stands improved. That such concentration has had excellent results is shown in the following figures:

TIMBER SALES, SOPRIS NATIONAL FOREST

Year	Live	Dead
1906	4,685,000 feet	6,211,000 feet
1907	3,520,000 "	3,402,000 "
1908	577,000 "	1,788,000 "
1909	502,000 "	2,266,000 "
1910	3,374,000 "	8,559,000 "
Total	12,658,000 "	22,226,000 "
Sale value, live, 26,439. Sale value, dead, \$26,128.		

It can be seen from these figures that in amount the dead timber disposed of exceeds the live by nearly two to one, and that, even though the fire-killed timber has to be sold at much reduced rates, the value almost equals that from sales of live timber.

Every possible inducement is offered to purchasers to help them in handling the dead stuff at a profit. New markets are watched for, low stumpage prices are considered, and special concessions of various sorts are made to permit of its being handled at a profit. The average stumpage rates for the past five years are \$1.18 a thousand for dead timber and \$2.43 a thousand for live. It should be stated that during the greater part of the first year all timber was sold for \$1 a thousand. The highest price received in a sale where all of the timber was dead was \$1.25 a thousand and 50 cents a cord. Much timber has been sold at a lower rate because of its inaccessibility. In some cases it has been necessary to build roads to get the timber out, in others a large proportion was unmerchantable, and in still others it had to be taken from a stand of live timber where care had to be used in logging so that no damage would be done to the young stand coming up.

While sawmills have been in operation in this part of the country for more than 25 years, it has always been the custom to cut no more dead timber than was actually needed for fuel in the boiler room. But since the Forest has been under administration every merchantable dead tree is removed from the sale area and is utilized for lumber, for "squared sets," or is shipped without sawing for use as "cribbing" in the silver mines. Not only does this conserve the live timber, but it adds greatly to the appearance of the cut-over area and saves the stand from damage which would result if the dead trees were left to be wind thrown or to add fuel to a chance fire. Conservative policies are used with the standing dead timber, and, in marked contrast to logging conditions of the past, all of the merchantable parts of the tree are utilized and where stumps were formerly cut at 2 feet and higher, depending upon the time of the year the cutting was done, they are now not higher than 16 inches, and all timber for lumber or silver mining purposes must be utilized to a diameter limit of 6 inches and even smaller.

During the fiscal year 1911, 4,524 cords of dead material was disposed of to supply props, lagging, and entry timber to coal mines in Pitkin and Garfield counties. This use enables the Service to make a clean sweep of dead timber, because the top diameter limit for such material is usually 4 inches and even as small as 2 inches. And since almost every buyer of dead timber can dispose of small material to the contractor for the coal mines, very few sales are being made which do not include the cord stuff. Thus it can be seen that this problem of securing close utilization has been solved, though it was a hard one because of many, many years of wasteful operation. The local Forest officers, as well as those further from the scene of action, have been the recipients of harsh criticism for sticking closely to this policy of thorough utilization, but since the methods and aims of the Service have become better understood, and since it is known why strict requirements are

made and that good sound common sense is at the back of these requirements, the criticism has largely ceased.

In addition to securing a closer utilization in logging, there is a constant effort to promote a closer utilization of the finished product, with a corresponding decrease in waste. Nearly all of the sawmills are cutting the best slabs into 8-foot lengths and are shipping them to the coal mines for "grain doors"; this has been the practice for a number of years. One mill on the Sopris utilizes the slabs from dead logs for the manufacture of laths; but it has not yet been determined whether this is a paying venture, since there is a low price on Mexican* laths, which come directly in competition with them.

An excellent example of close utilization is that of the Colorado Yule Marble Company, at Marble, Colo. Here the edge boards are used just as they come from the log for crating sculptured stone. This company handles large contracts for building material, and since much of it is highly carved and polished it has to be boxed or crated. Since excelsior is used around the pieces, lumber with an uneven edge will serve very well for outside protection. The company operates a sawmill on patented land, and, in addition to lumber which they secure from their own holdings, they purchase from the Forest Service. On this part of the Forest the supply is limited, the market is good, the timber is accessible and easily logged, and stumpage rates are relatively high.

In one case it was possible to interest a company in the exploitation of a large tract of dead timber by making a sale to cover a long term of years at an equitable stumpage rate. The tract was too far from the shipping point to pay a profit in handling under the system of hauling stuff out by wagon, but the company is now constructing an aerial tramway by which they will deliver the material to the railroad over a distance of two miles, as against seven miles by wagon.

As a result of the present policy of encouraging the sale of dead timber, it will undoubtedly be but a short time until a sale will be made of a large tract in Chapman Gulch, where at least 10,000,000 board feet of good merchantable stuff can be had if a road is constructed to bring it out. To induce the building of such a road the timber will be sold at a rate low enough to make it profitable to the buyer, and at the same time get rid of material which would not only deteriorate as time goes on, but would prove a serious fire menace.

Still another method of utilizing dead timber and enlarging the market, for it is through the construction and operating of an open-tank treating plant at Norrie, Colo. This plant was equipped and operated by the Forest Service, and used creosote and zinc chloride as preservatives. It was not run as a commercial venture, but poles and ties were treated at cost simply to get native treated timbers in use and to accustom consumers to this class of stuff. As was intended from the first, the plant was advertised and sold after a thorough demonstration was made and the treated material had

proved its worth. As a result of the demonstration, it was proved that the native timber, mainly lodgepole pine, was, after treatment, as desirable as the more expensive Douglas fir and cedar. The one objection to the native fire-killed timber was that it did not last in contact with the ground, for posts, poles, ties, and mine stulls, when it was used without preservative treatment. With treatment, there was much in its favor. It grows tall, clean, and uniform in size; in a telegraph or telephone line it is much more sightly, than either fir or cedar, because of this uniformity, and strength tests prove it to be near enough to the cedar to be acceptable for nearly every purpose for which the cedar is used. At least two other commercial treating plants similar to the one at Norrie, are proposed, which shows that the Government experiments not only opened the way to a new usefulness for the timber, but inaugurated a profitable industry.

The special concessions that may be allowed besides low stumpage prices, are various, and are carefully thought out to meet each problem. For some good stands of timber on Express and Castle creeks, above Ashcroft, not only will the cost to the buyer be made very reasonable, because of the inaccessibility of the stand and consequent cost of logging it, but a top diameter limit greater than six inches will be allowed. This may seem to be too great a concession, but conditions have to be governed by circumstances; while it is desirable to use all the merchantable parts of a tree, it is, nevertheless, far better to dispose of that part of the killed timber that can be handled at a profit rather than leave it all alone, so that the entire stand will fall into decay.

While various concessions of the character indicated have seemed advisable, they are only such as the condition, quality, and accessibility of the bodies of fire-killed timber warrant. In other words, these stands are handled with the same consideration for their commercial value as National Forest resources which is given to stands of green timber.

The present year is dull in lumbering, but there is a revival in mining; and as new mines are opened, a market which particularly seeks the class of material with which this article deals will be enlarged. But lest the good work of the Forest officers, with its encouraging response in larger sales, should lead to a too-roseate view, it must be kept in mind that at the present rate of disposal, the more inaccessible burns cannot be reached until after the timber will have deteriorated so far as to be unmerchantable; and even with the most Herculean efforts it is not to be expected that the rate of sales can be so accelerated as to remove this fact. In the meantime it is gratifying that practically no timber has been killed by fire since the Sopris has been under administration. A continuance of successful fire protection, together with the further extraordinary effort to clear out the dead timber that will be continued, will show marked changes in a very short period of years; and a longer period, except in the more remote parts of the Forest, will mean the effacement of the unsightly bleached skeletons of once green trees, and the return of a beautiful growing forest, of use and value, a conservator of moisture, and a refuge for birds and game.

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VERMONT SUMMER SCHOOL OF FORESTRY AND HORTICULTURE

By B. A. CHANDLER

IN the September issue of AMERICAN FORESTRY there appeared a long list of forest schools. In addition to three graduate schools there are some 66 schools listed as giving some forestry instruction. Judging from the brief description of the courses given in this list, it would seem that less than half of them are giving especial attention to the teaching of agricultural forestry; the remainder specializing in technical forestry. Such a list indicates the need of careful consideration of the tendency in present forest education. We need to realize, first, that the graduate technical schools of this country which are already established, can supply the demand for technical foresters; second, that undergraduate forestry departments in our universities and colleges cannot offer courses that will graduate men who can compete with the graduates from these graduate schools; third, undergraduate forest schools in our universities cannot graduate men who can rank as high in the profession of forestry as men from other departments of the same university rank in their profession. Under these conditions it is manifestly unfair to the students for these undergraduate schools to advertise to give technical forestry courses; but these schools undoubtedly have a field that is distinctly their own which they should cultivate, by teaching their agricultural students how to manage timberland in connection with farms; in giving the farmer of the state this same knowledge; and in giving men who wish to become technical foresters the best possible preparation for the graduate schools. This article does not aim to support these facts with argument, but only to point out a few well known facts.

It is self evident that the graduate schools already established can supply the demand for technical foresters. France, a country that does a great deal of technical forestry work, has only one technical forest school, while we have at least three which have been competing for first place. The United States Forest Service employs the greatest number of graduates of these schools, and it is well known that the supply is nearly equal to the demand.

The undergraduate schools cannot prepare their men as well as can the graduate schools, because, first, the first two years and some of the last two, must be spent in general education; second, the schedule of the forestry men must be adapted to the rest of the institution thus interfering with the field work, which is so necessary; third, one or two men must handle all the forestry subjects, while in the graduate schools each instructor is making a specialty of some particular line; fourth, often the instructors in these undergraduate

schools are giving only part of their time to the teaching of forestry, giving the rest to state work, private business or the teaching of some other subject; and fifth, the men do not average as high grade, and so cannot do as good work, as in the graduate schools because only the more energetic men elect the graduate work.

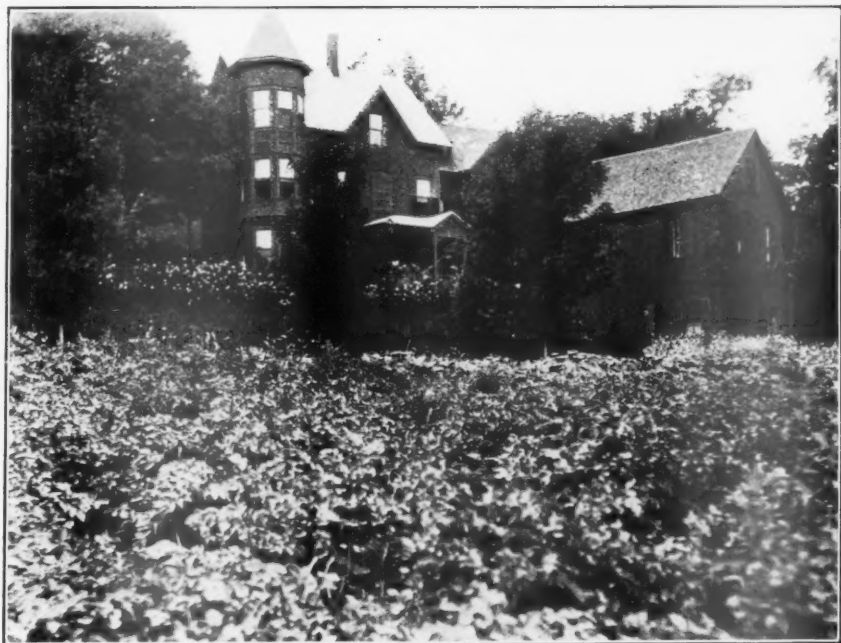
The men from the undergraduate schools are not only more poorly prepared than the men from the graduate schools, but they are not well enough grounded in their profession to be able to find work of a less technical nature than that done by the graduates of the graduate schools, which will give them equal salary or standing in their profession to that obtained by graduates of other departments of the same institution. It may be assumed that the United States Reclamation Service demands at least as high a standard in civil engineering as the United States Forest Service demands in forestry, and yet it is common for civil engineers from undergraduate schools to enter the Reclamation Service, while almost no men from our undergraduate forest schools enter the Forest Service.

Not only do the graduates from the undergraduate schools find it next to impossible to enter the Forest Service, but they do not find satisfactory employment outside of the government. Owners of large tracts of land who wish to employ foresters desire the best prepared men available and are willing to pay for them. Owners of small tracts cannot afford to employ foresters for, under present market conditions, it takes at least 10,000 acres to earn a salary of \$1,000 by improved management.

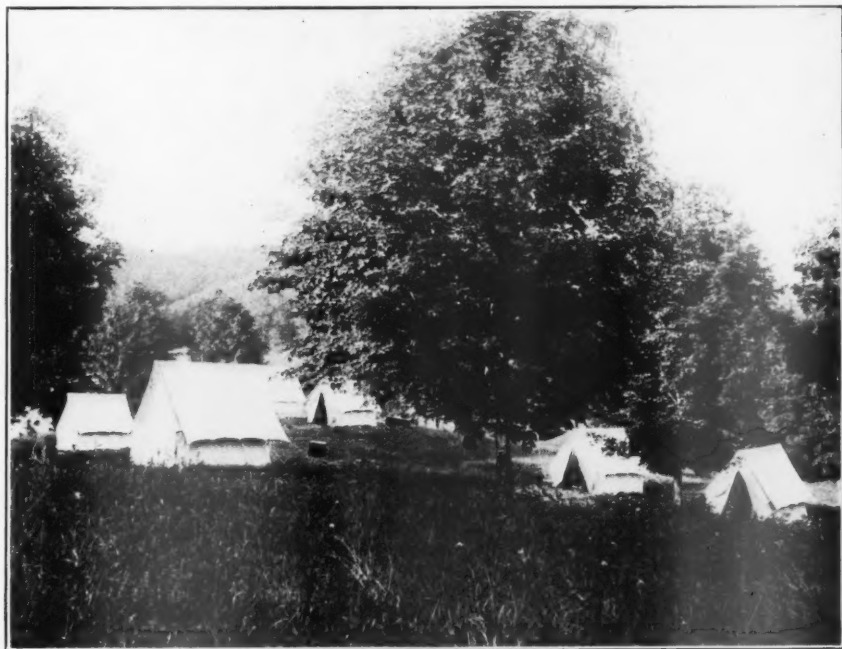
There are three distinct lines of forestry education that our undergraduate institutions can and ought to take up. First, preparatory course for the graduate forestry schools; second, the training of agricultural students to properly manage the timber land on the estates they will have charge of; and third, extension work through the holding of short summer schools and in other ways to train the farmers how to handle their wood lots and pasture land.

The universities and colleges having agricultural courses should maintain forestry departments to give the agriculture men training in the handling of wood lands. No agricultural training is complete unless it includes the proper management of such types of timberland as are found in connection with farms. In the future the up-to-date farmer is going to manage this timberland just as intelligently as he does his orchard or other cultivated land. He is not going to use it as a reserve for hard times, as his father did, but it is going to have a distinct place in his system of farm management. Since this is to be the case, no agricultural education is complete unless the management of timber land has been included. The college or university which has no agricultural department has no more moral right to offer a course of this nature than our undergraduate institutions have to offer a technical forestry course; simply because such a course lacks efficiency without the agriculture.

Of course, the great majority of farmers do not attend an agricultural college. They know little therefore about improved farm management or forestry unless it is carried to them. This is being done largely through the me-



CHARLES DOWNER'S OLD SUMMER HOUSE IN SHARON STATE FOREST.



THE CAMP.



FIELD WORK IN HORTICULTURE, VERMONT SUMMER SCHOOL.



TRANSPLANTING WITH GALE PLANTING BOARD.

dium of the "Better Farming Special" trains and the winter short courses in agriculture, farm institutes, granges, etc. A forestry course in an agricultural college or a state forestry department can make use of all these agencies to some extent in educating the farmers in handling woodlands. Forestry, however, is best taught by actual field work and so it would seem that the best means of teaching it to the farmer is through short summer schools held in different sections of the state. They can be held on state forests where the work in planting, thinning, and marking for reproduction cuttings, which has been done, can be seen. After they are started it will be well for a progression of courses to be arranged so that the men who come for a second year will find new work. It is doubtful if such schools should be more than two or three weeks long, for men who are busy on the farms cannot as a rule afford more than this length of time.

So far as the writer knows, Vermont is the only state to have tried a school of this type. Between August 14-24, the state forester in co-operation with the University of Vermont conducted a summer school of forestry and horticulture on the Downer State Forest at Sharon, Vermont.

This state forest is almost an ideal place for such a summer school. It was originally the summer home of Hon. Chas. Downer, and was given to the State by him for the purpose of promoting the forestry work in his section. The forest is well fitted for a school of this type, because, first, the farm house which is occupied by the keeper of the forest can be used as a boarding place for the students and for lecture rooms; second, the two orchards, one bearing and the other just starting, serve as fine practice grounds for the classes in horticulture; third, the nursery gives opportunity for making seed beds and transplanting; fourth, the vacant land not yet planned gives a chance for trying the different methods of planting; fifth, the plantations of many different species on different sites gives the student an opportunity to do some cleaning work and to see what plantations of different species look like and will do on different sites; sixth, the thinning of young maple orchards shows them what a young stand of maple needs; and the marking of the trees in the old stands shows how to cut in a woodlot to get good reproduction and to protect the soil.

The instruction in horticulture was conducted by Prof. M. B. Cummings of the University of Vermont. His lectures of two forenoons were followed each day by about five hours field work. Prof. G. P. Burns of the University of Vermont, formerly of the University of Michigan, gave three lectures and conducted as many field excursions in forest botany. The rest of the time was taken up with true forestry work conducted by Prof. A. F. Hawes of the University of Vermont, who is also State Forester, with three assistants. After these lectures the school was divided into three squads and the remainder of the day into three periods of two hours each. Thus a given squad changed work every two hours. These short periods were considered advisable in order to give a greater variety of work, thus preventing the student from becoming tired and giving them a wide range of work in the available time, and permitting each student to receive more individual attention. The field work included the following:

Making seedbeds, transplanting seedlings, actual planting by the different methods, cleaning in an old plantation, thinning a young maple orchard, marking for a cutting in a mature hardwood stand, the use of volume tables in estimating the timber of a woodlot, and the use of and comparison of the different log rules.

A fair amount of recreation was mingled with the work. The students lived in tents and in the center of the camp ground was a large open fire about which the students sat in the evening and sang songs, roasted corn and enjoyed themselves in other ways. There were eighteen students present from every section of the state, from Richford on the Canadian border, to Brattleboro, near the Massachusetts boundary. They were also of all ages, from sixteen to over fifty, and represented a wide range of occupations; farmers, gardeners, teachers, post-office employees and students.

The big day of the whole school was Sharon Day, when everyone from the surrounding country was invited to a picnic dinner followed by a few short talks. During the forenoon, while the people were arriving, Prof. Cummings conducted a demonstration of orchard pruning. After the addresses in the afternoon, an excursion was conducted over the nursery and plantations. Among the speakers of the afternoon were Dean J. L. Hills, of the State Agricultural College; Prof. M. B. Cummings; Hon. O. L. Martin, Commissioner of Agriculture; Hon. Clement Smith, Master of the State Grange; Mr. Charles Green, of White River, who is as interested in forestry as any man in the state; and Prof. Hawes. This gathering was well attended.

At the close of the school the students were inquiring about the prospect of another term next year and seemed to feel that the money they had invested (the only cost to them was for travel and board) in this term had been well spent. The school was an experiment on the part of the State forester, but was so successful that it will, doubtless, be an annual event.

The University of Vermont is also carrying out the other two lines of forestry education; forestry instruction for agricultural students and preparing students for the technical forest schools. This fall there are ten students taking this forestry course; nine of these are agricultural students who wish such forestry work as will fit them for managing the timberland on the farms they expect to handle. The work will consist of woods surveying, type mapping, thinnings, cutting to obtain reproduction, planting and nursery work, determination of stumpage values under given market conditions, and the use of yield volume, and growth tables. One student is preparing for one of the graduate technical schools and is taking such courses as will fit him for the work there, and such forestry work as will make his work there more valuable.

Sixty acres of forest land were burned over in one day, on October 30th, by a fire that is supposed to have been started by campers near the old Rip Van Winkle House near Catskill, N. Y.

PENAL INSTITUTIONS AND CONSERVATION

By F. A. GAYLORD

NEW YORK STATE FORESTER

THE subject of reforestation is now altogether too familiar a one to dwell on at any great length. It is universally conceived that, in order that our forest lands shall reach a maximum productiveness, they must be artificially reforested, either in whole or in part. The question boils down to not the need of reforestation, but the practicability of it and practicability means nothing more or less than cost. The first questions always brought up when trying to interest an individual in reforestation, are those concerning cost. Where you can interest one person in reforestation if you could prove a two per cent investment, you could interest ten men if you could prove a four per cent and a hundred men a six per cent investment.

We all will agree that there are extremely few, if any, individuals or companies who are willing to engage in a business without a profit. There is only one institution under our present mode of living which is in a position to carry on business in this way, that is, the State. Operating costs being the same, the state is in a position to furnish trees at a lower cost than any individual or company.

There occasionally has been a slight murmur of disapproval at the state engaging in an enterprise of this sort. This disapproval has been so far out-balanced by the opposite sentiment, that it amounts to little, and inasmuch as the state has been the prime mover in the direction of establishing nurseries in many of the eastern states, the disapproval can never be of the importance it would be if the state attempted to invade an already crowded field of industry. Private nurseries will, from the very start, come into existence with the state nurseries an actual fact.

Skipping the familiar arguments as to the state's right to further reforestation, let us concede that the state has, and always will have, a right to grow trees for the private individual, and that the state is in a position to best regulate the most important factors as to how the cheapest trees can be produced. It does not take much figuring to determine the cost of planting a thousand acres at \$7 per acre and then to figure the compound interest for fifty years. Now do the same at \$5 per acre. It can easily be seen that every penny in the reduction of the cost of growing trees is of extreme importance in profitable reforestation. So the question arises, where and how can we cut this cost?

Governor Dix of New York State has gone a great step in advance in answering this question. In the past there has been some talk in using prison

labor on nursery work, but Governor Dix was the first man to come forward and actually work out the plan on a scale of any size and put it into practice.

At Comstock, Washington county, a new state's prison is being built. When completed, it will accommodate 1,500 prisoners and be one of the best equipped prisons in the United States. At present it holds about 400. It is situated only half a mile from the D. & H. R. R. and the Champlain Canal. There is much fertile land in the present tract, water is abundant and the nearness to the Adirondacks, combined with the transportation facilities, makes this an ideal place to start the first prison nursery. This fall ten acres have been turned under to form the transplant nursery for the spring of 1912. At such an institution labor is figured at nothing. What will it mean to furnish transplants, formerly costing \$5 to \$7 at from \$2 to \$3 or less, and seedlings for practically nothing, aside from the shipping charges?

So much for the planters' end. How about the prison end? In the last few years there has been a very strong movement to get away from mediaeval customs still clinging to our prison systems. The movement is gaining momentum very rapidly and primarily it aims to get the prisoner out of the barred cell and place him under more congenial surroundings. Would not a prison nursery be a great step in this direction, getting the unfortunate inmates out in the sun and air, where he would lose his prison pallor and be more healthy and happy. The most intensive methods used in nursery work today could be multiplied and carried out to the extreme, thus insuring the finest kind of nursery stock.

There are of course drawbacks to this system. In the spring when the trees are taken up and new ones are transplanted, a large gang of men is necessary and prison officials are taking great risks if they allow, say, 200 men to work in a field together. This could be alleviated to a great extent by not having the nursery in a single unit, but at a large institution, having several tracts of from five to ten acres, scattered about the usually large area held in connection with such institutions. Again, the class of labor employed here is extremely poor. Warden Homer, of the Comstock prison, figures that the efficiency of prison labor is not more than half that of paid labor. Here the personality of the warden would play a most important part, one warden getting twice as much labor from the same body of men as another. This factor of inefficiency would not affect the ultimate result to speak of, but would be felt mostly in the size of nurseries and productiveness.

Next spring the nurseries of New York State will turn out 6,000,000 trees. If the experiment at Comstock is a success, and there is no reason why it should not be, this number should be increased many times within a few years. A great deal about conservation is heard nowadays, not only forest conservation, but conservation of all kinds, in order that a rich heritage shall be left for the coming generation. The poor unfortunates who are in penal institutions have conserved nothing, not even their moral and mental faculties. Here is a way, then, that they can, in part, pay off their debts to our succeeding generations, and in so doing be vastly the better off for it themselves and to society in general.

STATE FORESTRY—ITS RELATION TO CONSERVATION

THE development of forestry in the United States was the first direct effort to apply a policy of foresight in the handling of one of our greatest sources of national wealth. Out of the ideas which forestry emphasized grew the more recent movement for the proper care and management of waters and minerals. The term conservation is broad enough to cover all forms of management which tend to eliminate waste, safeguard the future and secure the best balance between immediate utility and future value. In this sense it is no new idea. Not only has the individual farmer who is farsighted conserved and developed his farm, but the States and national government have for many years actively assisted farmers through the agricultural department and State Experiment Stations, by educational measures. Forestry was at first confined to a similar educational role. But during the decades 1890-1910 national forestry developed an important new phase,—that of the nation as an owner of forest land. No new lands were purchased in this period, but the nation took the stand that the forest resources then owned by the public should remain in collective ownership and be managed as national property and not as private property. More recently, this same policy is urged for water powers owned by the nation, and for deposits of minerals not yet acquired by private interests. While the right of the nation to retain her own property is pretty fully conceded, the terms upon which this property should be developed and used are not settled and at the next session of Congress these questions must be dealt with. This is the simplest and most important principle underlying national conservation.

In addition to the collective ownership of resources, there arises the possibility that the government should regulate the management of property owned by private persons by wise measures calculated to prevent waste while safeguarding the interests of the owner as well as the public. It is along these two lines of government activity that the public or political features of conservation must develop. Private conservation may be encouraged as in the past, by education.

State governments will have an increasingly important role to play in conservation. Those States are fortunate which have adopted policies enabling them to retain or to acquire forest land, or to hold and lease mineral lands, instead of selling such lands for a small sum before their value materialized. The State, rather than the nation, comes in direct contact with private owners of land, and will be charged with the double duty of properly protecting these lands, and of enforcing whatever regulative measures are found necessary. This is the State's role in conservation.

State conservation must cover soils, forests, water powers, minerals, and fish and game, and will include state activities in education, ownership, and regulation of these resources. The problem before states is twofold—first, to decide what lines the activities of the State should follow, and, second, to create the most efficient form of commission or organization for doing the work.

At first glance it would seem in the interest of economy and efficiency to centralize and combine the field of operation in one commission, and in certain States the tendency is to do so. But this may not prove the best policy. The field of soil conservation is chiefly educational, and this is best handled by the agricultural experiment stations, free from control of state officials. The system of game and fish protection in most states is organized on the basis of state wardens, and is usually self-supporting from fines and other revenues. The management is vested in a state game warden or a state commission. Forestry includes fire protection, and the management of state forest lands. These duties are in most states placed with a forestry commission, or state forester. State lands not devoted to forestry are handled by state land commissioners whose duty is limited to the sale of such lands or of the timber and other natural produce as wild hay, and to more or less efficient efforts to prevent theft and fire. The state land offices have also been responsible for mineral resources on state lands and in a few instances these mineral lands have not been sold outright but mined on lease.

So far no states have done much towards regulating private business, the chief lines along which this may be possible being forests, minerals and water powers.

Consolidation of these activities should be advocated only if it makes toward efficiency as well as economy. In a certain stage of development of a new line of work, it is often best to concentrate attention on it and give it every encouragement by freeing it as far as possible from alliance with or subordination to other interests. An illustration of this principle is found in the relation between forestry and the protection of fish and game. The two subjects are closely related. By combining the work one commission takes the place of two. In European countries the forester is the game warden. And in this country the question of fire protection and game protection each call for a set of wardens employed at least in part by the state. Why should the two functions not be combined under one office and save duplication and expense?

This question cannot be answered on the grounds of economy. No one questions the necessity in cities of a fire department, entirely separate from the police department though it may double the expense. Efficiency is the object, economy being secondary.

Although not so clearly distinguished as in the case cited, the duties and responsibilities of a forest fire warden follow a different trend from that of a game warden. His effectiveness depends upon the impression he can make on the community, and the sentiment he can arouse against setting fires, for the duties of a fire warden should be to prevent fires, not merely to put them out. He should be well versed in local methods of fighting fires, and a good organizer

capable of handling men. Forest fire prevention to be successful requires forestry. The measures necessary to keep fire completely out of forest lands presuppose an interest in the forest crop for the protection of which fires must be prevented. The fire warden to be efficient must be at least in thorough sympathy with forestry, know the value of young timber, realize the damage from fires which burn on cut over lands, and be able to impress his views to others. The most efficient type of fire warden is therefore the one who is employed for this special purpose. The game warden, who is required to serve also as fire warden, may regard these duties as an irksome addition to his real work.

What may be said of the subordinate officials is more emphatically true of the central organization. Consolidation of forestry with fish and game means that the chief official is too often interested in the one to the neglect of the other. The chief fire warden of a state should either be the state forester or his assistant. A forester has a full appreciation of the real purpose of forest fire prevention and is working for the ultimate object back of it, mainly, the production of timber. Under his direction the fire wardens are constantly stimulated to better work, organized and instructed, and get results. If the Fish and Game Commissioner is required to be the State Fire Warden he has not the same interest. In most cases he has not a forester's knowledge of the subject, lacks incentive and performs his duties in a routine manner. We must have active progress if the fire problem is to be met. Efficiency, not economy, should be the watchword.

This is not an argument against allowing fire wardens to act as game wardens, if thought advisable, nor of allowing game wardens to serve as supplementary fire wardens. But the responsibility for the enforcement of fire laws should not be placed with a Fish and Game Commission any more than the enforcement of the State Fish and Game laws should be placed on the shoulders of the Forestry Department. Consolidation of these two departments does not at present seem advisable. In actual practice the states which have kept these departments entirely separate and have done good work in fire prevention are: Maine, New Hampshire, Massachusetts, Connecticut, Pennsylvania, Maryland, Wisconsin, Minnesota, Montana, Idaho, Washington, Oregon and California. Of these, Oregon recently abandoned the plan of using her game commissioner as state fire warden, in favor of fire wardens responsible to a forestry commission. Minnesota's new law installs an extensive force of fire wardens responsible to a state forester, and independent of the state game warden.

Of the states which have tried consolidation New York has since 1895 until 1911 had a Forest, Fish and Game Commissioner, who controlled both departments. But the work of each has been entirely separate. The superintendent of forests, with a force of appointed fire wardens paid by the state, protect the state lands from fire, and enforce other forestry laws such as the law requiring the tops of conifers to be lopped. A separate force of game wardens serves in the same territory, and are required to report fires and

supplement the work of the fire wardens. But there never has been an attempt to consolidate these two field forces, for it is well known that efficiency in either direction would suffer by it.

The State of Michigan has placed the enforcement of her fire laws in the hands of the State Game Warden with his field deputies. Michigan has faced for years one of the worst fire problems in the country and so far has failed to solve it. No reflection is intended on the State Game Warden who has made a strong effort. But the official who must cope with the fire problem in Michigan should be relieved of the burden of administering the fish and game law if he is to ultimately succeed. And it is only through forestry that success will ever be secured. A few southern states, as Alabama and Kentucky have, for purposes of economy, utilized their game warden force as fire wardens.

The conclusion drawn from the present condition of forest fire legislation is that the functions of State Fire Warden and State Game Warden, and of local fire and game wardens, should not be consolidated, and that this consolidation if effected will tend to seriously diminish the efficiency of the fire laws and the ultimate chance to secure the practise of forestry on a proper scale.

Further questions of consolidation will arise regarding forestry and state lands, minerals and water powers. The natural lines of organization will tend to the control of state lands and their resources by one body. This has already occurred in Michigan, where the Public Domain Commission now has charge of all state lands, and has superceded the Forestry Commission. In other states, as Wisconsin and Minnesota, the State Land Commissioner, or corresponding official, continues to handle all state lands until they are officially designated as forest reserves, when their control passes into the hands of the Forestry Commission. A division of responsibility similar to this exists in the national organization where the Department of the Interior retains jurisdiction over all public lands except those reserved for forestry, which are administered in the Department of Agriculture. And the same suggestion for consolidation has recently been made publicly by the Secretary of the Interior, the plea being that of economy and the avoidance of duplication of work.

In states where conservation commissions may in the future be established, as in New York at present, and in Louisiana, such commissions will undoubtedly combine forestry with the subjects of control of state lands, water powers and minerals. What effect this form of consolidation will have upon the development of forestry in these states is not a foregone conclusion. Forestry far more than mere forest fire prevention, demands trained services. Both for education, which the people, land owners and others need, and for the creation and management of State Forest reserves, the department should be so organized that there shall be practically no possibility of political appointments.

At present several states have Forestry Boards composed of members selected in such a way that the party in power cannot control them politically. In Wisconsin the board of five members is made up of the president of the

State University, dean of the State Agricultural Department, and three others. In Minnesota the Board of Regents of the University nominate two members, and the State Agricultural and Horticultural Societies also nominate members, while the dean of the Agricultural Department is a member *ex-officio*. Such boards have the appointment of the State Forester, thus insuring the permanence and freedom from politics of the forestry work. Similar wise provisions are in force in Maryland, Oregon, and New Jersey.

The danger to forestry from consolidation would arise in two ways,—first, through improper organization of commissions allowing appointments to be made for political reasons, and second, from subordinating the forestry work and placing it in the hands of some minor official with no particular authority or prestige. So much remains to be accomplished before state forestry even begins to fulfil its proper functions and the rate of progress is so slow compared with the need that should there be any real danger of losing ground by such consolidation it had better not be attempted.

The prediction may be made that the states which show the greatest progress in forestry in the next decade will be those which adhere to a policy of laying emphasis on forestry through the form of their state organizations. The conservation of other forms of public wealth is equally necessary, and may be accomplished at the same time and possibly by the same organization. But while there is a chance that ground may be lost, the advisability of consolidation in the interest of economy must be considered cautiously.

COMMERCIAL REFORESTATION

THE commercial possibilities of reforestation conducted upon a scientific and business-like basis are described in an article by Staff Correspondent Tinkham of the Grand Rapids, Mich., Press, following a visit to the forty-year-old second growth forest of David H. Day, near Glen Haven, Mich.

"The story of David H. Day's forty-year-old idea of making nature replace the timber from which man had carved fortunes and his modern, practical and detailed conception of what the future holds in store for the successful reforester, needs no embellishment," says Mr. Tinkham. "It speaks eloquently enough of the almost wizard-like foresight of the man and is tribute enough to his desire to build such a monument as few men in this world leave behind,

"But it is not wholly a desire to leave some material indication of his life work that is prompting David H. Day in pressing forward with his scheme of reforestation. He has it figured to a year, almost to a day and to the foot of timber what his new forest will net. He knows what the various timbers will be used for. He knows and has detailed plans for the utilization of this fortune nature is creating for his children and his children's children. And suffice to say that his plan encompasses what twenty years from now

will be a perpetual commercial forest that from year to year, indefinitely will keep the Glen Haven mill busy and furnish timber right at home in Michigan when lumbering will be an industry crowded into the remote places of the extreme north and west of the continent.

"David H. Day's forest is growing upon land that originally furnished fuel for what was in its time the greatest line of steamers that plied the great lakes. It was because Glen Haven was a wooding station for the boats of the old Northern Transportation Company which ran from Ogdensburg, N. Y., to Chicago, that Mr. Day had his introduction to the Glen Lake country. And before any other person in the United States had conceived the idea of scientific reforestation, the young steamboat agent, looking out upon the cut-over acres that had given fuel for the boilers of his steamships and seeing nature's determination to replace the slaughtered trees, conceived the idea that some time in what to him must have seemed the dim future timber in Michigan would be in such great demand that nature's work on this particular ground would yield up a fortune.

"When he obtained title to the lands he began giving nature the aids now recognized as a part of scientific reforestation. And he has watched the young trees shoot straight up as they reached and reached to place their foliage within the realm of the sun until now the day is not far distant, certainly not beyond the limit of his expectancy, when the forest will realize all his dreams and even more.

"During all these forty years since Mr. Day conceived the idea of growing a new forest upon the veritable graveyard of the virgin timber, this acreage has been one of his chief prides. He has seen his own ideas taken up and put into execution by national and state governments. To him there is nothing new in the term conservation. It has been the watchword of his operations.

"Forty years ago he was laughed at by the lumbermen of that day. The men who laughed were those who cut and slashed ruthlessly, made their fortunes and left the slashings an invitation to fires and devastation. David H. Day's methods are and always have been different and his reward will come when this 2,000 acres begins that period of perpetual yield toward which he has worked and planned.

LOOKING FAR AHEAD.

"His foresight today seems so extended and penetrating and calculating as to be just as much ahead of the times as in the days when he was alone probably in all the United States in his ideas of the value of reforestation and conservation. There can be no question that were his future plans dependent upon present conditions they probably never could be fulfilled. But Mr. Day has taken into consideration the inevitable increasing demand for timber. He has studied the methods in Germany, where the population demands have so restricted timber growth as to force upon the government the necessity of a conservation as yet undreamed of in America. He sees the

time when conditions will not be so far different in Michigan. He calculates carefully upon the fact that twenty years hence there will be none of the waste that characterizes the lumbering operations of today and he takes this into consideration in his outline of a schedule of lumbering upon his reforesting tract. When this forest matures to this point where cutting for his mill may be begun, a new era will have set in and the same acreage will be yielding greater returns.

"As has been indicated, with all this carefully calculated knowledge of what the conditions will be some fifteen or twenty years hence, he has been able to outline a tentative schedule and he has figured this 2,000 acres with perhaps a few hundred more to be obtained as the years pass, will be ample to keep the Glen Haven mill busy indefinitely. Under his plan of conservation and economy, nature simply will keep the saws constantly supplied. His forest tract will be no different in commercial aspect than his orchards. Each year he will harvest a crop of logs sufficient for his mill. When his children assume direction of his interests the mill always will have its raw product at hand. Indefinitely this cycle of things will continue, while the price of lumber and the demand constantly are increasing.

"Off hand Mr. Day could not tell how many acres he owns. It approximates some 5,000, however. And he has some of the finest tracts of virgin timber left standing in the lower peninsula. In fact he has enough of this standing timber to keep his mill constantly in operation until that time when the realization of his dreams and plans for the 2,000 acres of reforesting shall come.

"Probably nowhere in Michigan is there a more beautiful piece of timber land than this forest park of David H. Day. He makes no secret of the fact that had he no future plans for it he would have been more than repaid for his trouble and care in the simple grandeur of his acreage. There is nothing commercial about it. As one drives through its innumerable winding roadways it resembles nothing more than a magnificent park. There is a fine assortment of trees and they are growing just as nature intended they should, straight up and sturdy. There is a fine growth of oak, pine, maple, ash, cherry, hemlock, poplar, birch, etc.

"When these trees, aided as they have been by Mr. Day's conservation ideas, reach that point of maturity where they are ready for the market they will offer fine long, uniform logs, such as only that primeval forest gave to the saws of the pioneer lumbermen. And they will come to the market in the days when the very scarcity of the material has created a different regime of manufacture. For instance, the oak and the cherry and the ash will go to the veneering machines rather than to be pushed through the conventional log saw, where there is often more than 25 per cent waste in sawdust alone. The white birches, those most ornamental of all trees, such as have been prematurely sacrificed in order that the Grand Rapids Apple show be suitably and appropriately embellished, will be conserved to the last square inch in

order that the greatest possible number of thread spools may be turned from them.

"New chemical uses have been discovered for what one day was the refuse. Twenty years hence there will be still further uses. Not a twig will be wasted. It seems simply inevitable that fifteen years from now, judging from the increased demands for wood and the consequent increase of prices, that this 2,000 acres will be just as valuable an asset to David H. Day or his heirs, as any gold mine.

NEW PLAN OF LUMBERING

"The lumbering operation he has planned for the tract will be as different from the methods of today and of twenty years ago as the demand, the prices and the manufacturing utilization will be. He admits it would not be practical from a financial point of view to begin today upon the plan he has in mind for the future even were his reforestry experiment matured to that point where he would be justified in beginning the cut. It will be a new era in the woods. The axmen and sawmen will not go through and clean out every available tree. It will be an annual thinning out process. There will be a limit fixed below which no tree must be disturbed. Trees will be felled always with the idea of conservation uppermost. The smaller trees, the crop of future years will be protected. There is bound to be some little damage in this event where trees grow in such close relationship as in the Day forestry acres. But the men will work carefully.

"Fifteen or twenty years from now, Mr. Day estimates, his mill will have sawed up the last of the virgin timber he holds or will in the meantime be able to procure. By that time he will be prepared to put his plans into execution and his reforestation tract will be ready to yield its first dividends.

"He has figured the thing out very carefully and is satisfied that his estimates are entirely conservative. Two hundred acres will be sufficient under the new order of things that then will prevail, to keep his mill busy for a year. As has been said, the acres will not be cut clean. Trees of twelve, probably fourteen inches, only will be taken. All under that size carefully will be preserved. The woods will be cleaned up trimly as the logging operations advance. Protection against fire will be afforded and upon practical lines. By cutting over or rather, by weeding out the marketable timber of 200 acres every year, it will be ten years between the cuts over the same acreage. In other words, ten years will be required to cut over the 2,000 acres and the total acreage will be much larger than this by that time. At any rate, Mr. Day figured on ten years and says it is eminently conservative.

"The thinning out operations will have the effect of giving the remaining trees new impetus. Ten years will be sufficient to bring enough other trees to cuttable size to give the mills another year's supply from 200 acres. It will be evident that this means a constant rotation of things. Year after year a fixed area will be cut over. And once in a decade the same ground will be

gone over again. A good portion of the timber will be of the so-called semi-rare variety such as oak, cherry, ash, birch, etc. By that time they will seldom be using solid oak or cherry or ash. The foundation as it is today in many branches of wood manufacture will be of baser wood with a veneering of the higher grade to bring out all the beauty of grain and finish. The makers of thread are having trouble already getting white birch for their spools.

"It may be interesting to those who are visitors at the Grand Rapids apple show and who admire the fine white birch of the artistic booths, to know that thus far the thread manufacturer has been unable to find any substitute for white birch for spools that may be had at anything like a usable price. Almost every other variety of wood undergoes chemical changes and contains chemicals that would discolor the thread, especially the light tinted and white threads. Obviously this would be impracticable. So it is to the white birch the thread manufacturer must look for spools upon which to market his product. It is apparent then that white birch worthily deserves its name. Like its snow white coat it is white clear to the heart. Its sap is pure white and contains nothing from which a discoloring residue is left.

"There are thousands and thousands of these trees on the 2,000 acres of Mr. Day's reforestation tract. They all are pretty well matured. There is indication of a great fortune some day in white birch alone. The white birch for the land and apple show at Grand Rapids was picked out by Mr. Day personally and shipped some weeks ago. It is now being made into booths and bungalows in a building on Campau Street.

"The main tract of forest owned by Mr. Day comprises fourteen hundred acres. He has another tract of some 600 acres that is identical, though not exactly contiguous. The main drive through these acres and acres of magnificent young forest growth is one of the most popular trips in northwestern Michigan. It is the magnet that draws many automobile parties from all parts of the state."

During the season just closed, the state fire wardens and rangers of the Washington Forest Fire Association issued a total of 5873 permits to burn slashings. Forester Baileys says, "This indicates that the small rancher is clearing up his logged-up tract of land and putting it under cultivation at a more rapid rate than ever before."

EDITORIAL COMMENT

EXCEPTIONS will probably be taken to that portion of Mr. B. D. Chandler's article in this issue, which deals with the undergraduate forest school and the training and ability of its graduates. It is undoubtedly true that in the best grade of undergraduate schools a very thorough preparation for technical forestry may be obtained, and at the same time the student will save one or two years and considerable expense in getting his forestry education. Many men have passed the civil service examination for Forest assistant and received Forest Service appointments from undergraduate schools, and they will undoubtedly continue to compete with graduate schools for these positions. But, on the whole, the statements made in this article are substantially true. There is need in forestry for two classes of men: first, woods foremen and local superintendents of small estates, who are capable of conducting work such as planting, cutting of timber, or running a portable sawmill, at a salary which will bear a reasonable relation to the size of the tract and the revenue it will yield; second, foresters, capable of solving all problems arising in the profession. The standing of such men compared with the woods manager is that of the civil engineer compared to the construction foreman. The latter needs a practical education, but no one would deny the need of giving the engineer the best theoretical training, nor does he become less practical on account of it.

The technical problems which the high-grade forester must solve are met in the fields of

a. Management of very large forest areas in which problems of policy, business and scientific research are combined, such as for instance on the National Forests.

b. Organization and management of State forestry, involving the development of State policies, education of the public, plans for fire protection, taxation of forests and practical assistance to owners.

c. Private work, either connected with some large owner as a corporation or railroad where the work calls for diversity of training and application, or as consulting forester, whose function, like any other expert, is to give advice and formulate plans for the management of forests.

It is to fill these needs,—that of the forest engineer,—that the high grade schools exist, and the graduate schools have an undoubted advantage over undergraduate institutions, largely for the reasons given in the article.

On the other hand, a far greater number of men will be needed to fill positions of immediate responsibility in managing small forest estates, acting as rangers, woods foremen and in similar capacities, than will ever be needed for the broader positions. It would seldom pay these men to attend a graduate school, and too often in the undergraduate school, they get a course that is neither well suited to their immediate needs, nor satisfactory from the standpoint of the higher preparation. What is needed now in Forest education is a greater number of first-class schools for the education of rangers and woodsmen. Meanwhile the enormous field of popular education in forestry is either completely neglected or carried on in a desultory way by State or experiment station officials.

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RECENT FOREST SERVICE PUBLICATIONS

Value of Windbreaks

Tree planting has lost favor with present day farmers in the Middle West whose crops have never experienced the damage from the great winds that once swept unimpeded across the plains, and against which the early settlers planted trees as a barrier. It is the idea of the younger farmers of to-day that all but the most productive tracts of timber should be done away with, and their places taken by crops which will bring quick money returns. The fault, however, lies as much with the owners of the timber as with the trees themselves, for, while much progress has been made toward improved and more intensive methods of crop management, little has been done to increase the productiveness of the grove or belt of trees. The great need is for better management. In addition, care has not been given to forest plantations, and as a result, the revenue from them is only a fraction of what it should be. When the productive value of windbreaks is rightly considered, there will be in the benefit to crops, and in other helpful influences of the belt of trees, an annual income of considerable magnitude in addition to the value of thinnings, which, in certain regions, will bring the productiveness of the forest up to that attained by field crops. Forest Service Bulletin 86, Windbreaks, presents a very thorough study of the problem. The effects of windbreaks, both good and bad, upon nearby crops are gone into minutely, the possible timber yield from plantations is estimated, the species best adapted for windbreak planting are discussed, and suggestions given for the most efficient windbreaks for various regions.

Forest Service Bulletin 86, Windbreaks: Their Influence and Value, by Carlos B. Bates, Forest Assistant. Washington, 191. Pp. 100; plates 20; diagrams 35.

The Substitution of Colombian Mahogany for True Mahogany

That Colombian mahogany, *Cariniana pyramiformis*, is being widely substituted for true mahogany, *Swietenia mahagoni*, is the assertion made in Forest Service Circular 185, Colombian Mahogany: Its Characteristics and Use as a Substitute for True Mahogany. The great popularity of true mahogany as a furniture and finishing wood has caused a steady depletion in the available supply ever since its earliest use in about 1724. To-day, though the consumption of material passing in the markets as mahogany amounts annually to about 40,000,000 feet, the cut of real mahogany is only about 18,000,000. Colombian mahogany, which is the wood most often substituted for true mahogany, although it differs widely from the latter, in its botanical and anatomical characteristics, bears a close superficial resemblance to it, and its physical properties at once distinguish it as a high class cabinet wood. There is no reason, in fact, why Colombian mahogany should not be employed for all purposes for which true mahogany is used. There should be no objection to calling such a wood by its proper name. The wood is hard, heavy, strong, and tough, and in color and weight compares almost exactly with the genuine mahogany. Those who work Colombian mahogany wood observe that it dulls the saws and other tools very quickly, a fact which first cast suspicion

on it as not being real mahogany. It comes entirely from Colombia, and is cut at points from 100 to 200 miles inland, and is shipped from Cartagena.

Forest Service Circular 185, "Colombian Mahogany (*Cariniana pyriformis*): Its Characteristics and Its Use as a Substitute for True Mahogany (*Swietenia mahagoni*), by George B. Sudworth, Dendrologist, and Clayton D. Mell, Assistant Dendrologist, Forest Service, with a description of the botanical characters of *Cariniana pyriformis*, by Henry Pitteir, Bureau of Plant Industry. Washington, 1911. Pp. 16; Figures 11.

Over-Grazing Brings Floods

The harmful effect upon streamflow through denudation of the watersheds by over-grazing is illustrated graphically in Forest Service Bulletin 91, *Grazing and Floods*. That portion of the Wasatch Mountains embraced in the Manti National Forest in central Utah has for a number of years been subject to severe floods after all storms of more than usual violence, with corresponding scarcity of water during periods of drought. With the creation of the Manti National Forest in 1903, all grazing was prohibited on the uplands of Manti Canyon. From then until 1909 the area was protected from stock. In the latter year some 300 head of horses were allowed in the closed area. The exclusion of all stock from the protected area for five years gave the uplands a chance to become well clothed with vegetation before the flood season of 1909. The beneficial effects obtained from the protection of Manti Canyon were forcibly shown in 1909, when Ephriam and Six Mile Canyons were flooded severely, while Manti Canyon lying between them was not perceptibly effected. Both Ephriam and Six Mile Canyons were heavily over-grazed by sheep from 1882 until the establishment of the Forest in 1903, and have since then been closely grazed by cattle. Accordingly, at present there is a much better soil cover in Manti Canyon, and there seems to be no reasonable doubt that to this fact it owes its escape from the floods of August 17 and 31. Additional evidence of this is furnished by

the striking fact that although in the unprotected canyons floods occurred in 1906, 1908, 1909, and 1910, the last serious flood in Manti Canyon occurred in August, 1902, before any effort was made to protect it from over-grazing.

Forest Service Bulletin 91—*Grazing and Floods: A Study of Conditions in the Manti National Forest, Utah*, by Robert V. R. Reynolds, Forest Examiner. Washington, 1911. Pp. 16; map; plates 5.

History of the Pines

The uses of the many different species of pine and their histories are described in Forest Service Bulletin 99, *Uses of Commercial Woods of the United States; II Pines*. Thirty-seven species of pine grow in the United States, not any one in all the states, yet perhaps with one exception no state is without one or more. About 48 per cent of the total output of lumber in the United States in 1908 was pine. Longleaf probably furnished more than any other single species, and white pine was next. The western yellow pine, which is more widely distributed than any other pine in this country, is a large producer of lumber, and the western white pine and loblolly also rank high in quantity. The bulletin considers each species separately, taking up even little-known ones. The great variety of uses to which longleaf, shortleaf, loblolly, and Cuban, all grouped in the market under the common name of yellow pine, are put, is given in detail, and under the chapter on white pine an interesting account is given of the great lumbering operations in New England and the Lake states, now things of the past. Norway, jack, western white, western yellow, sugar, and loblolly pine all receive their due share of attention, and even the lesser known species, such as Chihuahua, pine, Apache pine, Mexican white pine, and single leaf pinon are taken up in turn.

Forest Service Bulletin 99—*Uses of the Commercial Woods of the United States: II Pines*, by William L. Hall, Assistant Forester, and Hugh Maxwell, Expert. Washington, 1911. Pp. 96.

President A. L. Flewelling, of the Western Forestry Association, says: "Each year fire fighting and fire prevention is becoming more and more a science. America leads in the forestry question from every angle, and I think I am safe in saying that large forest fires, especially in the Northwest, are a thing of the past."

STATE WORK

Fire Protection

Fire Warden Howell Thomas of Appleton, Wis., who is stationed at Crystal Falls, Mich., and has under his supervision about one-half of Iron County, comprising some half million acres, tells of what is being accomplished in preventing forest fires in his district. The work is being done by the Northern Forest Protective Association.

About 2,000,000 acres of forest and are represented in the membership of the association, the fire wardens or rangers receiving their compensation from a fund created by an assessment of $\frac{1}{2}$ cent per acre, which means about \$50,000 per year. While the fire wardens devoted the greater portion of their time to preventing fires and patrolling their districts, says Warden Thomas, they also did considerable educational work, instructing people residing in their respective districts as to the safest methods of disposing of their huge brush piles and as to building campfires. In many ways, says Warden Thomas, the fire wardens averted damaging conflagrations by a timely warning to woods people, who receive the rangers very kindly. The term fire wardens is used in place of forest rangers, by reason of the fact that they have power to make arrests and to demand assistance whenever occasion demands.

As this is the first year of the association the wardens have had considerable hardship, being obliged to make their patrol on foot. The leaders in the association, which comprises large lumber interests, however, propose to equip the wardens with horses and other equipment next year. Warden Thomas told of taking a fifty-mile trip with a fifty-pound pack on his back in order to cover his patrol and he says it was no simple task to accomplish it. The association further proposes to erect look-out or watch towers on the higher points of land in the respective districts, which will greatly enhance the efficiency of the patrols, and this will mean that the wardens will be employed throughout the entire year and not only during the season when fires threaten millions and millions of feet of timber.

In addition to keeping close watch on the interests of the land owners in the association the fire wardens fight fires on the property of others in order to prevent its spreading to property they are sworn to protect. Coupled with fire fighting is the duty of the

wardens to arrest land grabbers and in every way possible make it a point to see that nothing irregular takes place by way of transfers in lands and timber holdings. It will not be long, says Warden Thomas, when the protective association will have extended its lines into Wisconsin and Minnesota, if present plans of the organization do not miscarry, as things point most favorably in that direction at the present time.

Enforcing the Law

The New Jersey State Forestry Commission, of which Governor Wilson is the president, is strictly enforcing the forest fire service law, as this letter, sent to the Wantage township committee attests:

GENTLEMEN: The Forest Commission has decided that a forest fire service must be maintained in Wantage township. You are accordingly notified that unless a township fire warden who shall be satisfactory to the Forest Commission is appointed to serve for the year beginning January 1, 1912, and the necessary appropriation made for his salary and possible expenses, the Forest Commission will appoint a state fire warden to be fire warden of Wantage township as it is authorized to do by Section 2, Chapter 123, Laws of 1906.

You are reminded that the effect of such an appointment will be that no resident of Wantage township can burn brush, or make any fire in proximity to a forest, as provided by Section 9 of the Forest Fire Law without a permit from the state fire warden who may be serving as township fire warden. It is understood that this requirement will impose some inconvenience and possibly hardship upon residents of the township, but since you as representatives of the people have seen fit to ignore the requirement of the Forest Commission to provide a township forest fire service it is obliged to uphold the law even if the means involve inconvenience. And you may be assured that if the Forest Commission is obliged to resort to this course it will also enforce the law against all offenders.

The action indicated will be taken with great reluctance, and it is hoped that it may be avoided. The matter is therefore brought to your attention thus early that you may take the necessary steps to secure the needful appropriation for next year.

Idaho Experimental Stations

In order to become more familiar with the growth and reproducing of white pine timber, the bureau of forestry has established an experiment station in the Kaniksu National forest, Idaho. The station is located at the Benton ranger station and consists of a large building to be used for experimental work, a well-equipped laboratory, a greenhouse and a residence for the supervisor in charge. The station has been constructed under the supervision of R. Zuni of the bureau of civics, with headquarters at Washington, D. C.

The station will be under the direction of Donald R. Brewster, formerly of the Bear-tooth and St. Joe National forests and one of the best-known men in forest work in the northwest.

It is the idea of the department to become more familiar with the planting, growing and reproducing of white pine timber characteristic of this section. During the last few years the national forests of the west have to some extent been burned over, and it is the intention of the department to replant many acres of the burned-over areas, if experiments prove practicable. For this purpose they have already collected many thousands of bushels of white pine cones, which will be used in reseedling. Over 30,000 bushels will be collected this year to be used next season.

The station will also be used by the department of plant biology to determine causes and remedies for diseases that infest the forest trees in this and other localities. That the station is a permanent structure is evidenced by the stability of the structures. If this new venture is a success other experiment stations will be constructed in the west.

Encouraging Tree Planting

Very few Dutchess County, N. Y., land owners have taken advantage of the offer of the state of New York to supply young forest trees at a cost of only \$4 per thousand, says the Poughkeepsie, N. Y., News-Press. The state is very anxious to induce owners of untillable soil to plant these trees, which consist largely of varieties of the pine family.

George H. Sherman, cashier of the Farmer's and Manufacturer's Bank, whose country place is on the South Road, has set out several hundred of these trees, obtained from the state's nurseries in the northern part of the state. They all seem to thrive. The specimens are larch, spruce, fir and long leaf pine. In his pretty bungalow estate, Mr. Sherman will soon have these young forest specimens ready to take their places in the extension of his present grove, and in replacing any old trees that die or fall in storms.

The state has 11,000,000 trees to send out. The question of using prisoners in the work of reforestation is agitating many

countries. The government of New Zealand has tried it with success. About 1,100 prisoners have been taken to camps up in the wilderness, staying for a few weeks at a time, and in course of the work 22,000,000 young trees have been placed.

A Big Project

New Jersey State Forester Gaskill in speaking of the agreement he has concluded with former United States Senator John F. Dryden, and A. R. Kuser, for the development of the forests which they have recently acquired on the Kittatinny Mountain where no less than 100,000 evergreen trees will be planted next spring, says further planting will require at least 500,000 trees. Mr. Gaskill says:—

"Along with the planting, active work in the existing forests will be undertaken, chiefly by means of improvement fellings through which the worthless material now standing and some that is mature will be removed and opportunity given for the establishment of an economic forest. Other plans already under way include the making of a deer park of about 3,000 acres and the construction of a complete road system by which access will be given to every part of the property both for pleasure and for the removal of forest products. The roads will also be laid out with a view to affording security against forest fires and a complete fire protective system will be organized.

"Mr. Dryden's and Mr. Kuser's object in acquiring this property and undertaking to develop it is only partly to maintain an estate for their own pleasure, or to watch a forest grow. They have in mind the redemption of a considerable tract of wild land from the neglect and abuse into which it has fallen and believe that their venture will prove a good investment.

"The state forester, on behalf of the Forest Commission, welcomes this opportunity to bring so large an area of woodland under practical management. It is one more proof that the policy of the commission is a reasonable one; that is, if individuals can be encouraged to handle their woodland under the direction of foresters there will be no need to acquire a large state forest. The state will need more forests than it now owns, but in general the public possessions can be restricted to tracts having peculiar value as demonstration forests, for water control, etc. Thus, the greatest possible good to the whole community may be attained. In other words, right management of forest lands is the thing we strive for, state ownership is only a means, and unless State ownership leads to better management than private ownership there is no advantage in it.

"So far as the public is concerned, it is announced that while hunting will be entirely prohibited on these properties and mischief of all kinds controlled, all orderly people will have as free use of them in every other manner as heretofore."

NEW AND NOTES

Lecture by Governor Bass

Governor Robert P. Bass, of New Hampshire, the President of the American Forestry Association, gave a lecture on "The Conservation of Our National Resources" at Clinton, Mass., on November 3. The Clinton Courant says: "The subject as dealt with by Governor Bass was very interesting in an instructive way. In his opening remarks he stated that the subject was large enough for a whole series of lectures and only a few of the more important points could be touched upon in an evening. The speaker said if he was to talk politics he could no doubt make the subject more interesting, but he was not present for that purpose.

"He said that no public question of today is more fundamental than that of conservation. In 1908 the first governor's conference was held at Washington and as a result, a national conservation committee was chosen to have charge of the work. He then defined the meaning of conservation, which he said is an endeavor to preserve for future generations natural resources that are being rapidly used. Conservation is practiced by the federal state governments as well as by the people in general. Governor Bass divided the subject into four parts as of the most importance, these being: Forest, water-power, agriculture and minerals. In the latter are included the coal, gas and phosphates which are found in the West and South. He said the government must retain the title to those lands where the minerals abound in order to protect itself. He explained that these lands are leased to parties with a restriction on the amount which can be mined. There is also a provision in the lease which compels the lessee to operate the land for a certain length of time.

"Governor Bass touched on the Cunningham claims in Alaska, which were won by the government. In these claims are the two greatest coal fields in Alaska, and last spring a portion of them was claimed by a man in that section. The matter was investigated by the Secretary of the Interior and it was found that the claim was all right. Conservation is endorsed by the great monied interests all over the country.

"In regard to agriculture the speaker said that our method of carrying on the work is very extravagant, and he told of the difference in the amount of the crops raised in this country and those produced in Germany

and England. The loss to crops because of insect pests in a year is \$659,000,000. Special trains are sent about the country explaining the better ways of raising crops. This department is doing as much as any other department in the national government in the way of decreasing the high cost of living, he said. In regard to irrigation he said that congress appropriates a large sum of money each year for this work. In 1909, thirteen of the states in the union had systems of irrigation. These lands which are nothing more than deserts, are taken up by the government and irrigated and they are then sold and the money which is derived, is used in irrigating more land. These lands after they are once irrigated, produce some of the best crops in the country.

"Forestry was another subject which Governor Bass spoke on. He said that of the 550,000,000 acres of forests in the country, about 150,000,000 are in national reservations. The decrease in the forests each year is three times the increase, not counting the loss from fire. The forests produce twelve cubic feet of timber per acre each year, while the consumption is about forty cubic feet. In France the growth in timber land is the best in the world and the production there is fifty-three cubic feet per acre each year. The average yield from the forests per acre in Saxony is from \$4 to \$40, while in this country the yield is about $\frac{7}{8}$ of 1 mill per acre. In Germany \$3 is spent on each acre of land, while \$1 is spent here. He told of the importance of the rivers for water-power, and he said more and more each year the value of the water for power is being shown. He told of the Weeks bill which had been passed, with an appropriation of \$2,000,000 annually for irrigation."

Excellent Fire Control

W. I. Pack, supervisor of the Uinta forest, with headquarters at Provo, reports another fire season closed with a clean record for the patrol force, not a single fire having gotten beyond control this year, says the Salt Lake *Herald Republican*. Before this forest was proclaimed by President Roosevelt, fires in that region were frequent, often burning for weeks uncontrolled.

The rapid work and constant vigilance to make this record is shown by the fires discovered and put out during the past summer.

In the early part of August in the after-

noon, a ranger patrolling along the "Divide trail" discovered a fire, gave the alarm, set out himself at once to fight it, picking up all the help he could on the way. He arrived at the fire in the evening with four sheepherders and started to work at once.

The same evening at 8 o'clock another ranger thirty miles away received warning of this fire, saddled up and started to assist in fighting it, picking up four or five men on the way. He arrived there at 2 o'clock in the morning and began work.

A third ranger, at Heber, received instructions at 10 o'clock that same evening, picked up a small force and was ready to start in a short time. On account of the long distance, hard night riding, his party was delayed from reaching the scene until 8 o'clock the next morning.

With this extra help the fire was put under control before it gained much headway. The fire did little damage, but it was burning directly towards a large body of timber. Without quick action on the part of the ranger who discovered it and the help given by his brother officers, a great loss might have easily resulted.

Another fire was handled much in the same manner. The ranger patrolling on the "Divide trail" discovered it, rode at once to the telephone station nearby, informed the supervisor at Provo and went back to the fire at once. He picked up several men at the reclamation service camp, some campers and sheepherders and started in fighting.

Another ranger twenty-five miles distant was instructed to get all the assistance possible and ride to the fire. Not knowing how many men would be needed he telephoned to Spanish Fork to the president of the Stock Growers' Association, telling him of the fire on the forest and asking him to get together as large a force as he could, but not to send them until further instructions. In a short time a force of 100 men equipped with saddle horses and fire fighting tools was ready to start.

As it happened, this fire was under control and this extra force was not needed, but should the fire have developed as was first expected, 100 men would have been at it and would have crushed it out before covering a large area and doing much damage. The fire was discovered at 2 o'clock in the afternoon and in two hours was under control and entirely out before dark of the same day.

Late in August another fire was discovered near the forest nursery on Beaver Creek. The same quick, decisive action was taken and in a few hours a force of thirteen men and a complete fire-fighting outfit with supplies sufficient for three days was gotten together at Kamas.

They arrived at the fire at 7 o'clock in the evening and went to work immediately without waiting for anything to eat. By 2 o'clock in the morning the fire was completely trenced around and fairly well under con-

trol. The force stopped for a delayed supper and a short rest, returning to work at 4 o'clock. By 10 o'clock the same morning the fire was under control. This fire was burning directly toward a body of fine merchantable timber amounting to 30,000,000 feet and worth probably \$90,000.

The forest area embraced by the Uinta national forest, comprising over 1,285,000 acres, is on the west extension of the high and rugged Uinta range, and on the Wasatch range. It protects the heads of many streams important in irrigation and as a source of water supply for hydro-electric power plants. The main streams are. Duchesne, Strawberry River, Bear River, Weber River, Provo River, Black's Fork of Green River and Rock Creek. Important power projects are already in operation on the Provo, Bear and Weber rivers, and more are contemplated.

All these streams will ultimately be reserved to their utmost capacity for both power and irrigation purposes. The necessity, not now appreciated, of a complete and efficient forest-cover with the soil conditions which it carries, will then be beyond question. Fire is the most destructive agent of such cover.

The full force of the damage of many extensive old burned tracts is obscured by the subsequent shrubby growth. Quite a stretch of the imagination is required to picture fire denuded watersheds with their original dense forest cover.

Another important feature of a forest, although it does not figure directly as a money value, is the scenic effect. There are many beautiful lakes at the heads of the stream, particularly the Provo River. These spots are ideal camping resorts whose attractiveness and beauty would be destroyed by fire.

European Conservation

Captain John B. White, of Kansas City, who has been touring Europe investigating the practice of forestry and conservation for the United States Conservation Commission, said in a recent interview:—

"The United States has much to learn from Europe regarding the conservation of natural resources. We shall recommend the adoption of the methods of the nature of those which have been in successful operation here for many years. The taxation of American forests is a hardship which discourages the planting and cultivation of trees, and with its abolishment a long step forward would be taken.

"In Austria a landowner is relieved of taxation for twenty years, provided he grows trees on his property. The tax is imposed only when he starts cutting and begins to receive a return on his investment, and even that it is only nominal. In Switzerland, forests whatever their age, are always exempt from taxation.

"We need relief and encouragement of this character in the United States. Our con-

tention is that, when only one crop of timber is produced in a generation, it is unfair and unwise to levy a tax annually, for thirty or forty years, on timberlands. We believe timber should be treated like corn or wheat or any other crop—that it should be free from any taxation until it is cut.”

“The subject of forestry preservation should be removed entirely from the sphere of politics.” “The United States should handle it as a business proposition, as is done in France, Germany and most of the other European countries. In Germany the first demand made upon the forests is for firewood. The nation has found that it is cheaper to import timber for telegraph and telephone posts from Russia than to chop down its own trees by wholesale.

“The Siwald forest in Switzerland has been cultivated for more than 1,000 years. The city of Zurich owns it and operates a sawmill. The municipality’s profit, over and above the expenses of maintenance and replanting, is \$25,000 a year.

“Not only should the United States encourage forestry and development by removing the taxation from virgin forest lands, but it should adopt more stringent measures for the protection of its forests against fire. In Washington, Oregon and other pine-producing states in America probably as much timber has been burned as has been cut. We have seen afforded an object lesson in our travels about Europe.”

Municipal Forestry

Former Vice-President Charles W. Fairbanks, in an address at Lebanon, Ind., a few days ago advocated municipal forests. Places the size of Lebanon, he said, should establish municipal forests, whether by bequest or by drawing on the treasury of the municipality for the money.

Every town should have two hundred acres of land adjacent, which should be given to tree culture, he said. The devastation of the forests of to-day was deplored by Mr. Fairbanks. He cited the progress of Japan in attempting the preservation of the small forests in that country, and the work of conservation being carried on on a larger scale in China and Germany. Mr. Fairbanks made a stirring appeal that the boys and girls of to-day be enlisted in the effort for forest conservation. He recommended that trees be planted about the schoolhouses, the churches, hospitals and the home. The value of the municipal forests was said to be shared by the poorer class of people, who could not afford to pay exorbitant prices for wood in the winter season. With the city provided with the municipal forests poor persons should be allowed to draw on the municipal forests. Many persons, the speaker said, would be willing to give a tract of land for forest conservation.

Mr. Fairbanks closed with an appeal that the forestry movement have its sanction in the public schools, and that the children of to-day be instructed to conserve the re-

sources of nature, and not to impoverish the land adapted for tree preservation.

A despatch from Nevada City dated October 20, tells of able work in quenching forest fires started by incendiaries. It says: Supervisor R. L. P. Bigelow, of the Tahoe national forest, received a telephone message from North Bloomfield this morning to the effect that the two forest fires, which were set yesterday on Humbug Creek, below Lake City and North Bloomfield, were under control. The fire-fighters battled with the flames all night, finally conquering them.

The men worked under the direction of Forest Rangers W. A. Merrill, of North Bloomfield, W. H. Helbig, of Graniteville, and A. R. Ivey, of Nevada City, and crews were sent from Landsburg’s sawmill, North Bloomfield and Nevada City. Twelve men left this city yesterday evening and all of them were strong, able-bodied willing workers, carefully selected by Supervisor Bigelow.

Prompt action was necessary, as the fires were close to North Bloomfield and Lake City, and burned fiercely at times. The damage will not be heavy, but there was danger of those places being wiped out by the flames.

The people of North Bloomfield state that the fires were deliberately set by some unprincipled person, but for what reason they are unable to account. Had it not been for prompt action Bloomfield would undoubtedly have been destroyed.

At a recent convention of the New York State Waterways Association in Buffalo, Charles H. Jackson, of Albany, deputy state conservation commissioner, said the state led the world in planting trees and in seeking to renew growth along river banks.

“New York is doing twice as much as the rest of the United States in seeking to replant her forests,” said Mr. Jackson. “By using prison labor the state is enabled to raise trees at a minimum cost and thus supply the public much cheaper than nurserymen.” The speaker urged everyone interested in water power development to encourage the planting of trees.

At a banquet in Boston on November 9 Congressman Weeks, in a speech dealing with his bill for forest preservation, declared that last year’s revenue from forest lands in the Rocky Mountain district was \$1,000,000 in grazing and from \$4,000,000 to \$5,000,000 in forestry. He prophesied that in the future these revenues would pay the expenses of the forestry bureau of the Department of Agriculture.

A Correction.

In the article on “A Fire Protection Plan in the Southern Appalachians,” published in the November number of AMERICAN FORESTRY, it was stated by W. H. Weber, the writer, that the Cherry River Boom and Lumber Company is the owner of some 250,000 acres of timberland in West Virginia. By a typographical error this appeared in the article, as printed, as 50,000 acres.

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